

COUNTWAY LIBRARY



HC 4QFG 4

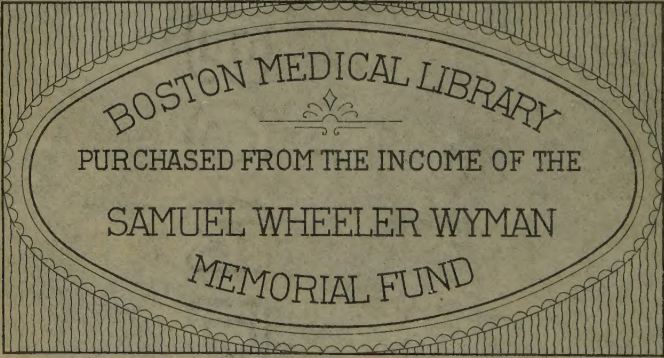
# THE CAMEL

## AND ITS DISEASES


By *H. E. CROSS*



5/- NET



BOSTON MEDICAL LIBRARY



PURCHASED FROM THE INCOME OF THE

SAMUEL WHEELER WYMAN

MEMORIAL FUND





35. 7. 1.

THE CAMEL  
AND ITS DISEASES



# THE CAMEL

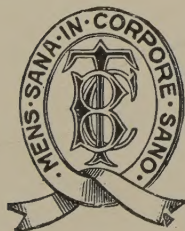
## AND ITS DISEASES

BEING NOTES FOR VETERINARY SURGEONS  
AND COMMANDANTS OF CAMEL CORPS

BY

H. E. CROSS, M.R.C.V.S., D.V.H., A.Sc.

INDIAN CIVIL VETERINARY DEPARTMENT  
CAMEL SPECIALIST TO THE PUNJAB GOVERNMENT

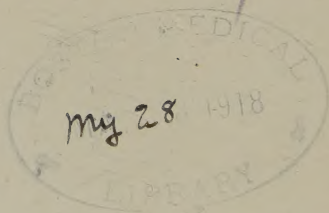


LONDON  
BAILLIÈRE, TINDALL, AND COX  
8, HENRIETTA STREET, COVENT GARDEN

1917

*All rights reserved*

15394W7





## INTRODUCTION

THE importance of the camel as a transport animal in tropical countries, and the fact that no up-to-date work on the general management and diseases of this animal is available for veterinary practitioners, or for Commandants of camel corps, are sufficient reasons for the publication of this little volume on the subject. Obviously, in the limited space at the command of the author, it would be impossible to deal fully with the pathology of the various diseases affecting the camel, but the salient points have been set forth in a concise manner, so that veterinary surgeons and others whose duties are concerned with the management of the camel in health and in disease are provided with a practical guide on the subject.

The chapter on Camel-Breeding should prove of value, as it is written by a specialist in this branch of work.



# CONTENTS

## CHAPTER I

### PURCHASE, LOADING, AND FEEDING OF CAMELS, AND METHODS OF RESTRAINT

	PAGES
The camel—The baggage camel—The riding camel—Pur- chasing baggage camels—Loading—Feeding—Methods of restraint - - - - -	1-28

## CHAPTER II

CAMEL-BREEDING - - - - -	29-44
By Major G. E. M. Hogg, Commandant 54th Silladar Camel Corps, and lately Commandant 52nd Silladar Camel Corps.	

## CHAPTER III

### FRACTURES, DISLOCATIONS, MALFORMATIONS, WOUNDS, AND LAMENESS

Fractures—Dislocations—Malformations—Wounds—Lameness	45-60
--	-------

## CHAPTER IV

### DISEASES OF THE MOUTH, THROAT, AND HEAD

Diseases of the mouth, throat, teeth, and ears—Affections of the eye - - - - -	61-68
---	-------

## CHAPTER V

### DISEASES OF THE SKIN

External parasites—Jhooling—Mange—Urticaria—Camel-pox— Tumours - - - - -	69-84
---	-------

## CHAPTER VI

## MICROBIAL DISEASES

	PAGES
Rinderpest — Surra — Filariasis — Hæmorrhagic septicæmia — Anthrax—Black quarter—Rheumatism—Tuberculosis—Foot and mouth disease . . . . .	85-109

## CHAPTER VII

## DISEASES OF THE RESPIRATORY SYSTEM

Pneumonia—Mora—Bronchitis—Pleurisy . . . . .	110-114
--	---------

## CHAPTER VIII

## DISEASES OF THE ALIMENTARY SYSTEM

Internal parasites — Constipation — Diarrhœa — Indigestion — Tympanites—Impaction of the rumen—Gastritis—Dysentery —Enteritis—Peritonitis—Specific peritonitis . . . . .	115-130
--	---------

## CHAPTER IX

## DISEASES OF THE HEART, KIDNEY, AND LIVER

Traumatic pericarditis—Œdema—Urinary diseases—Diseases of the liver . . . . .	131-132
--	---------

## CHAPTER X

## DISEASES OF THE NERVOUS SYSTEM

Nervous diseases . . . . .	133-136
----------------------------	---------

## CHAPTER XI

ANÆSTHESIA—CASTRATION—POISONING . . . . .	137-141
---	---------

BIBLIOGRAPHY . . . . .	142
------------------------	-----

## APPENDIX I

VERNACULAR NAMES OF DISEASES . . . . .	143
--	-----

## APPENDIX II

VERNACULAR NAMES OF FODDER FED TO CAMELS IN THE PUNJAB . . . . .	144
INDEX . . . . .	145-151



# THE CAMEL AND ITS DISEASES

## CHAPTER I

### PURCHASE, LOADING, AND FEEDING OF CAMELS, AND METHODS OF RESTRAINT

#### THE CAMEL

THERE are two species of camel :

1. The northern, Bactrian, two-humped or true camel.
2. The southern, Arabian, one-humped or true dromedary.

In India the one-humped species is the only one met with, though occasionally the two-humped camel is brought down by dealers from Turkestan for sale to Rajas as more or less of a curiosity. The two-humped camel is frequently seen at Peshawar when caravans arrive from Afghanistan.

Of the one-humped variety there are two main classes :

1. The baggage camel.
2. The riding camel.

#### THE BAGGAGE CAMEL

There are two main classes of baggage camel in India :

1. The plains baggage camel.
2. The hill or pahari baggage camel.

Breeding is carried on in such an indiscriminate way that it is impossible to classify the baggage camel into different

breeds or classes with any degree of accuracy, and no attempt will be made to do so. In comparison with the plains camel, the hill camel is a very much more compact animal, with shorter legs, rounder feet, and greater muscular development. The plains camel and the hill camel are both capable of carrying heavy loads; the Government load for a camel as laid down in regulations is 5 maunds, or 400 pounds, but natives usually load their camels with 8 to 10 maunds (600 to 800 pounds), and a camel that is well fed and well looked after is quite capable of carrying 8 maunds (600 pounds). It is a common sight to see big camels, in good condition, carrying 12 maunds, or 960 pounds. For continuous work on military expeditions a load of 5 maunds (400 pounds) can be easily carried, and if the camel is well looked after and properly fed, 6 maunds is not too heavy a load. When purchasing camels for military expeditions, the weight that the animal has to carry should be taken into consideration, and, provided he is up to the weight, the smaller the camel the better, for the smaller the animal the smaller the quantity of food he will require to keep him in condition—an important consideration on military expeditions. The well-to-do native usually starts working his camel when 4 years old, the load being 2 to 3 maunds; the poorer owners frequently work them when 2 or 3 years of age, with the result that the camel never develops and is more or less worn out before he reaches maturity. No camel should be worked before he is 5 years old; the camel is at his prime at 8 years of age. The working life of a baggage camel varies greatly, but might be put at 10 years—namely, from 6 to 16 years of age. Were the camel properly looked after and well fed, his working life might be greatly increased. When working camels in strings, not more than three camels should be tied together, and one man should not be given more than three camels to look after. The pace of the baggage camel may be taken as 2 to 2½ miles per hour. For continuous work, marches should not be more than 12 to 14 miles, though if the camel

is well fed and not overloaded, marches of 20 miles are not excessive, if only occasionally performed. Camels on the march should be allowed one day's rest a week. Each string of three camels should be composed of camels more or less the same size, and the strings of smaller camels

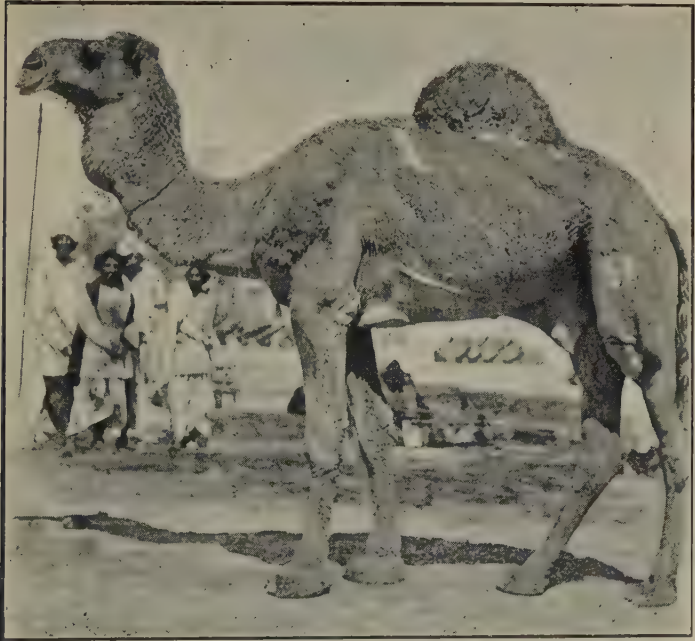


FIG. I.—THE BAGGAGE CAMEL.

should be placed first. The big camel can cover more ground at each stride than the small camel, and for the small camel to keep up with the big one without extra exertion is impossible; an extra rate of only  $\frac{1}{4}$  mile an hour makes all the difference, whether the camel will arrive fresh or fatigued at the end of the march.

### Points of the Baggage Camel.

1. Good muscular development and firm, well-developed hump.
2. Thick neck.
3. Big head.
4. Bright eye.
5. Big-boned.
6. Good girth, broad-chested and short-backed.
7. Fast walk.
8. Sound feet and pads.
9. Freedom from "kutch," "baddar," "puggi," and "kumree."
10. Freedom from wounds on the back where the palan (saddle) rests.
11. Good condition.

### THE RIDING CAMEL

The riding camel, compared with the baggage camel, is a much lighter animal and shows much more breeding. The head is small, the neck thin, feet small, the chest broad, and the muscles are well developed. A good riding camel can cover very long distances—60 to 70 miles. He can travel 30 miles a day comfortably for days on end, the average speed being 6 to 7 miles an hour. The tail of a riding camel should be tied to one side by a thin rope fastened to the saddle, to prevent the rider getting splashed with urine.

#### Dentition.

In the upper jaw there are 10 molars and 6 tushes; in the lower 8 molars, 6 incisors, and 4 tushes. The number of tushes varies considerably.

Five to twelve days after birth the 2 central temporary incisors appear.

At 1 year old 6 temporary incisors; these become worn down till—

At 4 years old the incisors are nothing but stumps.



At 5 years old 2 permanent incisors.

At 6 years old 4 permanent incisors.

At 7 years old 6 permanent incisors.

At 8 years old 6 permanent incisors, and the tushes appear.

After 9 years old the age of a camel is determined by the wearing of the tushes and the shape of the incisors, and needs

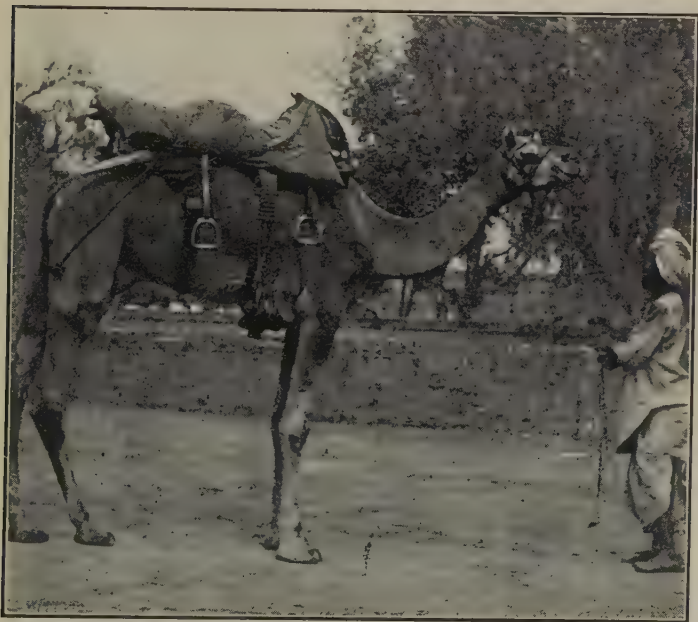


FIG. 2.—THE RIDING CAMEL.

considerable experience. As age advances the tushes become worn; the incisors, instead of being thin and elongated, become rounder and shorter, until in very old age they are nothing but stumps.

The following terms are applied to male camels:

Kotila, 1 year old.

Mazat, 2 year old.

Tirhan, 3 year old.  
Chhatter, 4 year old.  
Donda, 5 year old.  
Changa, 6 year old.  
Chigga, 7 year old.  
Neshwalla, 8 year old.

## PURCHASING BAGGAGE CAMELS

When purchasing camels attention should be paid to the following points:

1. Type of camel required.
2. Weight-carrying capacity and endurance.
3. Age.
4. Condition.
5. Freedom from disease.
6. Malformations.

**I. Type of Camel.**—The class of camel to be selected will depend greatly upon the nature of the country in which he will have to work. Best results will be obtained by purchasing camels in a district the nature of which approaches most nearly the district in which he will have to work. It is useless to expect camels bred in sandy deserts to do well in hilly tracts. For work in hilly districts camels bred in hilly districts should be purchased, and for work in desert country camels bred in desert country should be bought; for not only must the climate and nature of the country be taken into consideration, but also the kind of fodder and browsing that the animal has been accustomed to. Although the camel can be trained to eat almost any fodder, he does not take readily to fodder and browsing he has not been accustomed to, and if put into grazing grounds containing shrubs he has not been used to, he will not browse readily, and rapidly falls off in condition. Further, if a plains camel is put into a hilly grazing ground he is "lost" for some time, and deaths from falls are numerous.

**II. Weight-carrying Capacity and Endurance.—**

The camel must be capable of carrying the regulation load.



FIG. 3.—“MUST” CAMEL (WITH “NOSE NET” FIXED), SHOWING THE “TUCKED-UP” APPEARANCE ALWAYS SEEN IN “MUST” CAMELS.

The more compact the animal, the more suitable he is for weight-carrying, and he is much more likely to “last.” Size

and height are no criterion as regards strength and endurance; a short-legged, short-backed, deep-chested camel with well-developed muscles and neck should always be selected in preference to the tall, long-legged, narrow-chested animal.

**III. Age.**—No camel should be purchased that is under 5 years old, in either peace or war time. The age above which a camel should not be bought will depend upon the circumstances prevailing at the time of purchase. During peace-time no camel should be purchased above 8, but during war-time camels, if in good condition, may be bought up to the age of 12.

**IV. Condition.**—*The condition of a camel* is judged by the size and firmness of the hump and the development of the muscles of the hind quarters, thighs, and forearms. In connection with condition, the time of purchase is an important consideration. During the cold weather the camel is hard-worked, and, secondly, it is during the cold weather that he becomes "must."

During the cold weather not only are the camels worked hard, but grazing is poor, and the native owner cannot afford much hand feeding, so that the condition of camels in, say, February cannot be expected to be so good as in, say, September. Further, when a camel is "must" he will not graze much and loses condition.

**V. Freedom from Disease.**—In order to determine whether the camel is free from disease special attention should be paid to the following:

1. Temperature.
2. The fæces.
3. Examination of the blood.
4. Coughing.
5. The way the camel sits down.
6. Eye.
7. Flanks.
8. How the camel feeds.
9. Wounds.



*Temperature.*—The normal morning temperature of the camel may be taken as  $97^{\circ}$  F. to  $98^{\circ}$  F.; the normal evening temperature as  $100^{\circ}$  F. to  $101^{\circ}$  F. Any camel showing any considerable rise above the normal should be rejected. A



FIG. 4.—“MUST” CAMEL, SHOWING PROTRUSION OF SOFT PALATE OR PALU.

rise in temperature indicates systemic disturbance, and although to all outward appearance the camel may appear in perfect health, an abnormal rise in temperature shows there is something wrong, which, though not noticeable, is brought into evidence by the thermometer.

*The Fæces.*—The fæces in health consist of small oval balls somewhat bigger than a pigeon's egg and fairly hard in consistence. If the camel is constipated the balls are hard, more elongated, with twisted ends. Though constipation can be easily treated, it may be a symptom of impaction and other disorders.

*Examination of the Blood.*—An examination of the blood is made in the following way:

A very small portion of the ear is cut with scissors, and the ear squeezed till a small drop of blood exudes. To this is applied a clean cover-glass, so as to get a small drop of blood in the middle of the cover-glass; the cover-glass is then applied to a clean slide and examined under a  $\frac{1}{6}$ -inch objective for *Trypanosoma evansi* and filaria. If present, the trypanosome or filaria will be seen wriggling about amongst the corpuscles, and the camel should be rejected.

*Coughing.*—No camel noticed to be coughing should be bought.

*The Way the Camel Sits Down.*—If, when the camel is in the act of sitting down, trembling of the muscles of the thighs is noticed, it is suffering from kumree, and should be rejected. It is always advisable to put three men up on the camel and make him sit and rise with the load; frequently, if only slightly infected with kumree, he will not show any signs when there is no load on, but if loaded the trembling of the muscles can be distinctly seen. If the camel is suffering from bruised pads or wounds in the pads which have been plastered over with mud to deceive the purchaser, they may often be detected by observing the way the camel sits down. A sound camel should sit down straight and evenly, whereas a camel suffering from bruised pads or wounds in the pad will not bring his weight straight down on to the pads, but will sit down obliquely, to avoid the pressure on the painful part, and when down will cautiously straighten himself.

*The Eye.*—The eye of a healthy camel should be bright and vigorous; there should be no watery discharge.

*The Flanks.*—The flanks should not be hollow. There

should be no tucked-up appearance. Should the owner state that the tucked appearance is due to the camel having been without food for a considerable time, the statement should be verified by placing some fodder in front of him and noting how he eats it; should the camel eat it as if he did not care whether he had it or not, he should be rejected, as there is something radically wrong with him—a camel in health eats greedily. In order to fill out the flanks a common dodge amongst camelmen is to pour down the camel's throat three or four buckets of water.

*How the Camel Feeds.*—By observing the way a camel “tackles his feed” is one of the best methods by means of which we can determine whether the animal is ill or not. If in health, he will eat the fodder put in front of him greedily, but if sick, though he will feed, he does so as if he did not care whether he ate it or not.

In chronic diseases such as surra the camel will eat ravenously between the paroxysms of fever, but during the paroxysms, when surra-infected and in other diseases, he will not do so.

*Wounds.*—The most serious wounds are those of the feet and pads and on that portion of the back where the palan, or saddle, rests. No camel with a wound on the chest pad should be bought, neither should a camel with any bad wound on that portion of the back where the palan rests be bought. When purchasing, a careful inspection should be made, as camelmen are adepts at plastering up wounds with mud. The nostrils should be carefully examined for wounds caused by the nose peg and for wounds infected with maggots. Camels with torn-out nostrils should not be bought.

**VI. Malformations.**—The purchaser should look for—

1. Cutch (*vide* p. 49).
2. Budder (*vide* p. 50).
3. Ruggi (*vide* p. 50).
4. Girki (*vide* p. 51).
5. Tumours and wounds of the pads (*vide* p. 59).

6. Lameness due to rheumatism (*vide* p. 107).
7. Sore feet (*vide* p. 60).
8. Swellings or suppuration of the inguinal, pre-scapular, and parotid glands (*vide* p. 68).

**The Gear of a Baggage Camel.**—The gear consists of—

The saddle.  
 The neck rope.  
 The crupper.  
 The girth rope.  
 The loading rope.  
 The nose peg.  
 The leading rope.  
 The nose net.

In addition to these, a waterproof sheet and short piece of rope should be carried.

*The Saddle.*—This consists of two pads ending in a peak behind and strengthened with pieces of wood horizontally and longitudinally. The pads are stuffed with straw or grass, Puniah grass or rice straw being the best.

*The Neck Rope.*—This may be an ordinary rope or goat-hair webbing; the latter is best, as, having a wider surface, it is less liable to gall.

*The Crupper.*—This consists of a plain ordinary rope, and should not be drawn tight.

*The Girth Rope.*—This is an ordinary piece of rope, and should not be drawn too tight. It should be placed behind the chest pad.

*The Loading Rope.*—This rope should be 60 feet long, and be made of good material.

*The Nose Peg.*—The nose peg is made of wood in the shape of a collar stud. The hole for the nose peg is made by Indian camelmén by passing a strong needle, threaded with string, through the nostril. The ends of the string are tied and left in for a few days; this string is then replaced by thicker string, and after a few days (when the hole is big enough) the small end of the nose peg is pushed through.



*The Leading Rope.*—The leading rope should be made of goat hair, goat-hair ropes being very durable, strong, and elastic. It is attached to the nose peg by a piece of string about 8 inches in length. The object of attaching the



FIG. 5.—STRING ATTACHED TO THE LEADING ROPE.

leading rope to the nose peg by string is to prevent the nostril being torn when the leading rope is unduly pulled. If a severe strain is put on the leading rope, the thin string breaks, and tearing of the nostril is thus avoided.

*Waterproof Sheet.*—A waterproof sheet should always be carried ; it can be used for feeding the grain to the camel, for protecting the loads from rain, and protecting the camel, when camped at night, from rain.

A small piece of rope about 6 feet long should also be carried ; it is useful for tying up the knee of the camel when he is camped at night, or when an examination is to be made when standing or sitting.

## LOADING

Loading of the camel should be done with the greatest care ; if the loads are not carefully put on, the camel will soon get galled and be rendered useless. The main principle to be observed is that the load is well balanced and does not shift about. The site where the camel is loaded or unloaded is of great importance. When loading or unloading a camel a stony place should be avoided, as also should slippery ground. If camels are loaded or unloaded in stony places, there is a great likelihood of the pads becoming bruised, resulting in wounds and suppuration. Once suppuration starts in a pad it is extremely difficult to treat, first on account of the structure of the pad ; secondly, it is almost impossible to keep the wound clean, as it is constantly coming in contact with dirt. If the site is wet and slippery, it is difficult for the camel to rise or to sit down. On slippery ground the hind legs are specially liable to slip outwards, resulting in fractures, dislocations, and ruptures of muscles. The site of loading and unloading should be dry and soft.

Sometimes when a camel is being loaded he will get up before the load has been properly fixed ; especially is this the case with young camels, but some old camels have the habit. To prevent camels from rising before the loads have been fixed two methods may be adopted :

1. Fixing a knee rope.
2. An attendant can put his foot on the forearm.

If on the line of march the load of any camel is seen to be swaying about, the animal should at once be halted and the load properly fixed. Whenever there is a halt of any length, the camel should not be kept standing, but should be made to sit; not only does it give the camelman a chance of making any alteration in the load, but it is bene-



FIG. 6.—KNEE ROPE FIXED.

ficial to the camel, for it is much better for the animal to remain sitting under the load than to be standing. When large numbers are being loaded, no camel should be allowed to get up till all are ready to start; to prevent the animals getting up the knee rope should be applied as shown in Fig. 6.

If this is not done, a number of camels will get up and be standing for a considerable time before marching off; for if one camel gets up, a number will follow suit. To obviate this the knee rope should always be applied when loading



FIG. 7.—ATTENDANT WITH FOOT ON FOREARM.

a large number of animals. After the camels are permitted to get up, they should be allowed a few minutes in which to urinate before they are marched off. On the march, after every 7 miles, it is advisable to halt the camels for

a few minutes to allow them to urinate. After arrival at their destination the camels should be at once sat down and not kept standing, and the loads removed as quickly as possible. The camels should be allowed to graze about for a short time with the saddles on till they have cooled down, or, if this is impossible, a small quantity of fodder should be placed in front of them, and the saddles not removed till they have cooled down. After removal of the saddles the camels should be hand-rubbed and a careful inspection made of their backs and also of the palans. If there are any signs of galling, the camels should not be loaded next day, and the cause of galling should be inquired into. If due to the palan, it should be altered accordingly; if not due to the palan, the cause will be found to be due to the camel being badly loaded. The palans should be carefully inspected and properly cleaned. After watering the animals, if they have not been watered on the line of march, the ration may be fed, and the tarpaulin put over the loins of the camel if there is a likelihood of rain.

## FEEDING

Camelmen prefer browsing to any hand feeding of their camels, and the camel undoubtedly thrives well when he is given sufficient time to browse and the browsing is of good quality. He will eat the leaves of almost any shrub or thorny tree, but he cannot be said to take readily to browsing on shrubs or thorny trees to which he has not been accustomed. He can be trained to eat almost anything, but it takes time, and if stall-fed with fodder that he is not accustomed to, he will starve for days together before he will eat it. When feeding a camel on any new kind of food, it is advisable to start by mixing it with fodder to which he has been accustomed, gradually increasing the amount. In feeding a camel it must be borne in mind that he is a ruminant and must have bulk. Camels doing hard work



should be given a grain ration in addition to straw. In the Punjab the private-owned camel has to depend largely on browsing, which is supplemented, if the browsing is poor and the owner can afford it, by missa bhusa or moth bhusa and, when available, by green taramira, green moth, and green gram, etc. Experiments carried out on the quantity of food a camel will eat gave the following results. The camels were of medium size, were doing no work, had poor browsing during the day, and were surra-infected. The fodder was fed at night.

### TWELVE POUNDS OF GRAM AND MISSA BHUSA.

(G. for gram and B. for missa bhusa.)

Day.	Camel No. 1314		Camel No. 55		Camel No. 658		Camel No. 714		Camel No. 773		Camel No. 83		Camel No. 393		Camel No. 48	
	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.
1st ...	12	18	12	8	12	14	12	15	12	17	12	18	12	26	12	12
2nd ...	12	28	12	22	12	19	12	30	12	24	12	15	12	12	12	10
3rd ...	12	27	12	22	12	22	12	22	12	18	12	27	12	22	12	15
4th ...	12	28	12	22	12	20	12	17	12	26	12	12	12	18	12	16
5th ...	12	31	12	29	12	20	12	30	12	27	12	11	12	20	12	17
6th ...	12	31	12	30	12	25	12	35	12	31	12	11	12	17	12	8
Average	12	27.1	12	22.1	12	20.0	12	24.8	12	23.8	12	15.6	12	19.1	12	13.0

Average : Gram 12 pounds and missa bhusa 20.6 pounds.

## SIX POUNDS OF GRAM AND MISSA BHUSA.

(G. for gram and B. for missa bhusa.)

Day.	Camel No. 1987		Camel No. 2921		Camel No. 638		Camel No. 714		Camel No. 1959		Camel No. 1759		Camel No. 894		Camel No. 1314	
	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.
1st ...	6	20	6	26	6	23	6	22	6	22	6	30	6	28	6	28
2nd ...	6	12	6	23	6	20	6	22	6	20	6	27	6	27	6	25
3rd ...	6	18	6	20	6	30	6	30	6	25	6	30	6	32	6	30
4th ...	6	14	6	23	6	30	6	21	6	20	6	25	6	27	6	27
5th ...	6	20	6	24	6	24	6	24	6	19	6	24	6	23	6	16
6th ...	6	17	6	27	6	22	6	20	6	20	6	23	6	24	6	25
7th ...	6	23	6	24	6	30	6	30	6	20	6	26	6	27	6	20
8th ...	6	20	6	26	6	22	6	30	6	21	6	25	6	25	6	15
9th ...	6	18	6	21	6	30	6	29	6	18	6	27	6	23	6	27
10th ...	6	20	6	25	6	30	6	31	6	13	6	26	6	23	6	27
11th ...	6	18	6	25	6	18	6	27	6	17	6	30	6	28	6	14
12th ...	6	19	6	20	6	30	6	22	6	21	6	30	6	26	6	20
13th ...	6	19	6	22	6	35	6	26	6	23	6	27	6	25	6	18
14th ...	6	17	6	20	6	31	6	17	6	20	6	27	6	25	6	22
15th ...	6	18	6	27	6	30	6	24	6	15	6	25	6	25	6	20
16th ...	6	18	6	12	6	17	6	30	6	13	6	20	6	20	6	30
17th ...	6	17	6	20	6	29	6	28	6	18	6	22	6	22	6	24
18th ...	6	17	6	23	6	31	6	35	6	19	6	22	6	25	6	25
19th ...	6	16	6	22	6	20	6	26	6	22	6	25	6	16	6	15
20th ...	6	25	6	26	6	19	6	30	6	25	6	29	6	20	6	30
21st ...	6	20	6	22	6	25	6	30	6	10	6	20	6	24	6	27
22nd ...	6	16	6	18	6	19	6	26	6	21	6	20	6	19	6	34
23rd ...	6	17	6	25	6	30	6	20	6	22	6	28	6	24	6	16
24th ...	6	22	6	20	6	27	6	28	6	26	6	30	6	22	6	24
25th ...	6	21	6	23	6	22	6	25	6	23	6	24	6	22	6	20
Average	6	18'4	6	22'5	6	25'7	6	26'1	6	19'7	6	25'6	6	24'0	6	23'1

Average : Gram 6 pounds, and missa bhusa 23'1 pounds.

## DISEASES OF THE CAMEL

## MISSA BHUSA.

Day.	Camel No. 658	Camel No. 1987	Camel No. 1759	Camel No. 714	Camel No. 2921	Camel No. 894
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1st ...	27	26	33	30	23	35
2nd ...	22	22	30	28	20	22
3rd ...	30	24	26	26	20	28
4th ...	26	20	25	21	22	20
5th ...	28	26	28	16	25	22
6th ...	26	18	32	18	27	28
7th ...	22	22	23	16	23	24
8th ...	22	22	15	22	20	25
9th ...	30	32	32	20	32	39
10th...	31	24	28	28	23	24
Average ...	26.4	23.6	27.2	22.5	23.5	26.7

Average : Missa bhusa 24.9 pounds.

## GRAM AND MISSA BHUSA.

*Two Years Old Camels.*

Day.	Camel No. 11 (Male).		Camel No. 12 (Male).		Camel No. 13 (Female).	
	Gram.	Missa Bhusa.	Gram.	Missa Bhusa.	Gram.	Missa Bhusa.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1st ...	4	12	4	11	4	6
2nd ...	4	12	4	14	4	12
3rd ...	4	12	4	17	4	14
4th ...	4	12	4	16	4	12
5th ...	4	20	4	12	4	10
6th ...	4	21	4	17	4	13
7th ...	4	22	4	18	4	18
8th ...	4	22	4	18	4	12
9th ...	4	17	4	15	4	13
10th...	4	15	4	14	4	13
11th ...	4	16	4	14	4	17
12th ...	4	21	4	13	4	10
Average ...	4	16.8	4	14.9	4	12.5

Average : Gram 4 pounds and missa bhusa 14.7 pounds.

## SIX POUNDS OF GRAM AND MOTH BHUSA.

(G. for gram and B. for moth bhusa.)

Day.	Camel No. 1		Camel No. 2		Camel No. 3		Camel No. 4		Camel No. 5		Camel No. 6	
	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.	G. lbs.	B. lbs.
1st ...	6	20	6	28	6	19	6	20	6	18	6	22
2nd ...	6	19	6	30	6	20	6	20	6	24	6	30
3rd ...	6	20	6	28	6	29	6	30	6	30	6	40
4th ...	6	20	6	30	6	30	6	35	6	27	6	37
5th ...	6	21	6	34	6	27	6	37	6	30	6	10
6th ...	6	23	6	30	6	20	6	36	6	35	6	20
7th ...	6	23	6	30	6	23	6	36	6	33	6	20
8th ...	6	24	6	32	6	21	6	38	6	25	6	30
Average ...	6	21·25	6	30·25	6	23·6	6	31·5	6	27·7	6	26·1

Average : Gram 6 pounds and moth bhusa 26·7 pounds.

## MOTH BHUSA.

Day.	Camel No. 33	Camel No. 1052	Camel No. 773	Camel No. 1361	Camel No. 157	Camel No. 1624	Camel No. 383	Camel No. 620	Camel No. 273
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1st ...	20	18	20	15	39	22	20	22	15
2nd ..	24	23	20	12	25	20	20	20	20
3rd ...	25	20	20	20	27	20	25	36	25
4th ..	28	25	30	29	34	33	25	30	32
5th ...	29	24	35	29	40	40	40	40	37
6th ...	29	25	40	22	38	36	30	37	32
7th ...	25	33	38	27	28	35	40	32	33
8th ...	30	28	44	22	35	35	40	34	40
9th ...	35	27	37	30	28	41	35	32	30
10th	32	27	25	25	41	39	38	38	39
11th	25	30	27	28	37	42	39	45	40
Average	27·4	25·4	30·5	25·5	33·8	33·0	32·0	33·2	31·1

Average : Moth bhusa 29·9 pounds.

## FIVE POUNDS OF BARLEY, TURNIPS, AND MOTH BHUSA.

(B. for barley, T. for turnips, and M.B. for moth bhusa.)

Day.	Camel No. 1052			Camel No. 33			Camel No. 1314			Camel No. 1361			Camel No. 773		
	B. lbs.	T. lbs.	M.B. lbs.	B. lbs.	T. lbs.	M.B. lbs.	B. lbs.	T. lbs.	M.B. lbs.	B. lbs.	T. lbs.	M.B. lbs.	B. lbs.	T. lbs.	M.B. lbs.
1st ...	5	20	25	5	20	30	5	20	30	5	20	25	5	20	30
2nd ...	5	20	20	5	20	21	5	20	21	5	20	30	5	20	30
3rd ...	5	30	30	5	30	30	5	30	30	5	30	21	5	30	30
4th ...	5	0	28	5	30	28	5	30	15	5	30	40	5	30	30
5th ...	5	30	22	5	30	34	5	30	30	5	30	27	5	30	22
6th ...	5	30	20	5	30	25	5	30	25	5	30	25	5	30	19
Average	5	26.6	24.1	5	26.6	28.0	5	26.6	25.1	5	26.6	28.0	5	26.6	26.8

Average : Barley 5 pounds, turnips 26.6 pounds, and moth  
bhusa 26.4 pounds.



SIX POUNDS OF GRAM AND GREEN TARAMIRA (*Eruca Sativa*).

(G. for gram and G.T. for green taramira.)

Day.	Camel No. 714		Camel No. 1759		Camel No. 658		Camel No. 617		Camel No. 1653		Camel No. 606		Camel No. 894	
	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.	G. lbs.	G.T. lbs.
1st ...	6	50	6	44	6	64	6	59	6	72	6	65	6	71
2nd ...	6	59	6	64	6	59	6	55	6	75	6	70	6	76
3rd ...	6	49	6	60	6	50	6	62	6	64	6	74	6	58
4th ...	6	74	6	58	6	74	6	48	6	68	6	62	6	70
5th ...	6	80	6	82	6	70	6	82	6	78	6	82	6	70
6th ...	6	46	6	82	6	61	6	79	6	69	6	74	6	72
7th ...	6	65	6	62	6	78	6	78	6	67	6	78	6	64
8th ...	6	74	6	65	6	73	6	73	6	75	6	74	6	74
9th ...	6	52	6	58	6	74	6	76	6	69	6	73	6	77
10th ...	6	59	6	60	6	68	6	60	6	72	6	72	6	72
11th ...	6	60	6	61	6	68	6	60	6	68	6	77	6	75
12th ...	6	59	6	62	6	51	6	79	6	69	6	80	6	86
13th ...	6	39	6	44	6	42	6	61	6	51	6	62	6	68
14th ...	6	51	6	53	6	35	6	68	6	57	6	69	6	73
15th ...	6	60	6	62	6	56	6	73	6	62	6	78	6	68
16th ...	6	61	6	58	6	63	6	69	6	71	6	70	6	59
17th ...	6	45	6	50	6	52	6	77	6	62	6	60	6	62
18th ...	6	52	6	59	6	70	6	78	6	66	6	72	6	64
19th ...	6	52	6	62	6	71	6	69	6	68	6	69	6	69
20th ...	6	70	6	56	6	69	6	75	6	72	6	72	6	78
21st ...	6	68	6	54	6	62	6	77	6	72	6	65	6	58
22nd ...	6	78	6	77	6	58	6	78	6	79	6	78	6	71
23rd ...	6	68	6	62	6	48	6	67	6	75	6	64	6	68
24th ...	6	72	6	66	6	67	6	78	6	77	6	72	6	76
Average	6	60.1	6	60.8	6	61.7	6	70.0	6	69.0	6	71.3	6	69.9

Average : Gram 6 pounds and green taramira 66.1 pounds.

## GREEN SARSON.

Day.			Amount eaten by Each Camel.					Amount given to Each Camel.
			No. 773	No. 1314	No. 1361	No. 1052	No. 33	
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1st	...	...	82	82	82	82	82	82
2nd	...	...	100	100	100	100	100	100
3rd	...	...	140	145	150	149	150	150
4th	...	...	186	170	192	152	175	200
5th	...	...	143	130	183	160	175	200
6th	...	...	120	140	130	179	160	200
7th	...	...	115	145	168	135	140	200
Average	...	...	126·5	130·2	143·5	136·7	140·2	

On the fifth day the fæces become soft, followed by diarrhœa on the sixth. Average: Green sarson, 135·4 pounds.

## Summary

The average amount eaten was as follows :

1. Gram 12 pounds + missa bhusa 20·6 pounds.
2. Gram 6 pounds + missa bhusa 23·1 pounds.
3. Missa bhusa without grain 24·9 pounds.
4. Gram 6 pounds + moth bhusa 26·7 pounds.
5. Moth bhusa without grain 29·9 pounds.
6. Barley 5 pounds + turnips 26·6 pounds + moth bhu sa 26·4 pounds.
7. Gram 6 pounds + green taramira 66·1 pounds.
8. Green sarson 135·4 pounds.

Two-year camels ate on an average 4 pounds of gram + 14·7 pounds of missa bhusa.

These experiments were carried out with camels suffering from surra and doing no work. It is therefore probable that healthy camels doing hard work would eat more. The experiments, however, show that the Government ration o



FIG. 8.—RESTRAINT OF CAMEL (see p. 26).

The neck rope is not necessary except with vicious camels.

16 pounds of a mixture of white (wheat straw) and missa bhusa (pea straw) is insufficient. Camels can be trained to eat wheat straw, hay and oat hay, etc. They will also eat barley and Indian corn, but they do not relish the latter.

## METHODS OF RESTRAINT

In examining camels it should always be remembered that the camel, though usually free from vice, is a very powerful animal, capable of kicking with both fore and hind feet in almost any direction, and that with one bite he can kill a



FIG. 9.—METHOD OF SECURING CAMEL FOR DRENCHING.

man. Before examining a camel or performing any operation, measures should be adopted by means of which he is rendered incapable of doing any damage to either the attendant or operator. Before making any examination of the animal the attendant should hold the leading rope. This restraint is quite sufficient when a casual examination only

has to be made. If, however, further restraint is necessary, this can be applied by the attendant seizing the top lip in one hand and the lower lip in the other, as shown in Fig. 8 (p. 25).

If still further restraint is necessary, a rope should be



FIG. 10.—METHOD OF GIVING AN INTRAVENOUS INJECTION.

passed under the forearm and over the neck and drawn tight, and a rope under the hind legs and fastened over the back, the lips and ears being held by attendants. To administer a drench, both forelegs should be tied and the head thrown back, one attendant holding the lips and another the ears, while the drench is poured down its throat.



*Throwing the Camel on One Side.*—A rope is passed round the forelegs, over the neck, and drawn tight. Another rope



FIG. II.—METHOD OF GIVING A DRENCH.

is placed under the fetlocks or the hind legs and drawn tight over the back. One attendant seizes the lips and twists the neck while other attendants push him over.

## CHAPTER II

### CAMEL-BREEDING

BY MAJOR G. E. M. HOGG,

Commandant 54th Silladar Camel Corps, and lately Commandant  
52nd Silladar Camel Corps.

LET me say by way of introduction that I am assuming that the reader of the following paragraphs has some knowledge of the camel and its habits of rutting, which vary in different parts of the area on the globe's surface he occupies; that he can recognize its points, and can discern between prevailing types. Without dwelling on the importance of these in their bearing on the subject, it may be stated briefly that, although there are only two species of the *genus* camel, there are, or perhaps it would be more accurate to say there have been, any number of varieties of the Indian species. Forest legislation, by preserving large areas of *rakh* and closing them altogether to the camel, and canal legislation, by reclaiming large tracts formerly available for camel-grazing, have limited the operations of the camel-breeder, confined him to restricted localities, and thereby assisted, if not actually induced, the disappearance of former more or less distinct types of camel by bringing them together into common areas. With the exception of Rajputana, camel-breeding in Upper India has for the past half-century or less been on unscientific lines, and but few attempts have been made to breed to a pattern. The result of this is the *dogla*, which figures throughout the country as well as in all camel corps. The *dogla* (cross-bred) type, if, indeed, type it can be called, is the camel

with which my readers are most familiar. The difference between the camel bred in Rajputana and the ordinary Punjab example is the difference between the race-horse and the hack. The former has a lean game head with a bold and alert eye, ears like a well-bred cat, and admirably curved neck, wide chest, magnificent forearm, girth about 2 inches greater than height at the shoulders, and quarters which, without being massive, are more proportionate than is the case in the Punjab camel of to-day, and which do not slope away too much. His expression is amiable and interested, yet he is not to be trifled with, and his whole bearing is one of courage and nobility. He conducts himself like a gentleman at all times, even when he is suffering from love-sickness (*i.e.*, during the *masth* season), in which respect he presents a marked contrast to his bastard cousin.

The *dogla*, on the other hand, has often a coarse, dull head, with low protruding underlip, a neck like a sign-post, straight shoulders, elbows tucked in, weak, shapeless hind quarters, and impossible hocks. With these physical deficiencies he combines an uncertain and revengeful temper, and a loathsome lack of self-control when rutting.

Of present-day distinct varieties, the *parwindah* and the *peshin*, met with on the Afghan and Baluchistan borders respectively, are the most pronounced, and are easily recognized. These camels are much shorter in stature than those bred in the Punjab, and are chiefly remarkable for their thick coat and the magnificent hairy growth which adorns their necks, shoulders, and forearms during the winter months. They possess short and sturdy legs, good quarters, and are splendid weight-carriers and fast movers in hilly country. They cannot stand heat. These are likely to remain as distinct types, as camel-breeding across the frontier is not hampered by forest legislation.

There is a type of camel, purchased by camelmen in Dera Ismail-Khan, which has much in common with the *peshin*, being of similar stature, but not quite so hairy, and lacking his magnificent bony structure. The Jhelum camelmen call

this type the *Derajat Wallah Oont*. He is best described as an inferior edition of the *peshin*, who is probably his antecedent. The *Thal* camel is also a distinct type. He is of all camels the most miserable specimen.

Rajputana camels have been bred on scientific lines by His Highness the Maharajah of Alwar. The Alwar Durbar used to breed a showy stamp of animal, valuable for transport purposes. His Highness's breeding-farm was located in hill *rakhs* close to his capital, and the farm produce ran wild up to four years of age. Its management was in the hands of Rewari camelmen and doctors, by far the best in India. We have described the Rajputana camels, and it only remains to add that an accumulation of their splendid qualities was reached and perfected after years of selection in His Highness's breeding-farm. These blood animals were remarkable for their courage and character. The Alwar camel is harder-footed and slightly shorter in stature than his Bikanir contemporary, and his neck has a deeper curve and is more gracefully set on. Except that he has a leaner and more well-bred head, and is slightly longer in the leg, he is the counterpart of the *pahari* camel of the Punjab.

The Punjab *pahari* camel, as it is called by camelmen, is really the camel that used to be bred in large numbers on the Salt Range. As a type it is still met with, but unhappily there is every reason to anticipate its ultimate extinction.

The Gujrat camel does not seem to differ in any way from the Montgomery camel, and the latter is simply a bulkier description of the Sindh camel. It is impossible to separate these three types, which are essentially those of plains camels. The Montgomery and Sindh camelmen divide their camels into further subtypes; but, so far as the writer knows, these further distinctions are only those of colour.

These three examples of camels doubtless possessed at one time dissimilarities of configuration and habit, which are disappearing under the influences of the new camel-grouping resulting from the reclamation or closing of old grazing areas.

The camels bred at Lyallpur also come under this head—fine imposing-looking beasts, of the greatest value for work in the plains of India, but likely to break down on frontier altitudes, and therefore only of partial value from the military standpoint.

The breeder, having made up his mind as to the type of animal he wishes to reproduce, makes his purchases accordingly. He will be well advised to buy his first *dachis* either pregnant or with *toda* at heel, and he will pay attention to the examination of their teats, as barren *dachis* and *dachis* with blind teats are always on the market for the unsuspecting. The writer has seen a number of *dachis* with one or more blind teats, and he once had one whose milk-supply was entirely closed on this account, the *toda* she gave birth to being attached to a foster-mother on the farm, who brought the youngster up with her own, in the presence and with the acquiescence, at first grudgingly bestowed, of the real mother. The quartette formed an interesting and pathetic menage, the readiness of the foster-mother to increase her responsibilities and the tenaciousness with which the real mother aspired to a remnant of her offspring's affection being quite indescribable.

I think camel-breeding operations are best described by visualization, and I will ask my reader to accompany me forthwith in his imagination to a farm over the affairs of which I presided some years ago.

It is February, the season of giving in marriage in camelry. We have forty head of brood stock, including youngsters, on the hills beyond the river. We must appoint a *sandh*. We need not purchase one. Have we not 1,068 male camels in our corps? We must be in a bad way if these do not include a fair sprinkling of promising sires.

February is the best time for bringing the services of a bull to bear on the *dachis* in your stud farm in the Punjab. You must not allot him more than fifteen *dachis* in one season. Some of these will require more than one visit. See that he is a gentleman, refined in his manners, not too

imperious. Remember he is to be in the society of ladies for three months. March is the ideal time for the conception. The period of gestation is nearer thirteen months than twelve in the experience of the writer. April is the perfect month for the confinement, but you must start in good time to insure both the *sandh* and the *dachis* being in their sexual prime to the end of the former's appointment. After the first day, on which you will not interfere too much, you must allow for at least three days between each visit, and you must keep in mind the limitations imposed by a restricted rutting season. Nature, however, will come to your assistance, and will almost certainly extend, if necessary, the period when the *dachis* are in heat to admit of them all receiving the bull's attention.

Let us time our own arrival on the farm, thirteen miles distant, to precede, by half an hour, that of the *sandh* we have chosen. We will fill up the interval by a stroll round your new acquaintances. They are an unlevel lot, you will say, and they are shorter in stature than the camels in the ranks of the corps. Some have humps like the domes of temples, some give the appearance of coming on nicely, while others are frankly emaciated. You see that little group of youthful matrons, and note the grand condition they are carrying? How contented they look! They are all pregnant. During the next few weeks they will be increasing the population of our farm. They have never been through it before. All their lives they have been putting on flesh by the simple process of unhampered grazing. In the adjoining ravine there are a few more elderly matrons, also pregnant. These have been through it before. A couple of two-year-olds browsing on a neighbouring slope, within hail, represent the remnant of their produce of two seasons back. These *dachis* are also in good condition, which they have been putting on for the past eighteen months. Not more than six months should be allowed for the suckling of the baby. The *dachi's* teats should then be bagged. This gives her five months to



recover strength before she is put to the *sandh* again, and a further period of about thirteen months in which to become completely restored to strength for her next confinement. A maund of *gur* may be given with advantage in evening feeds of 1 pound daily to all *dachis* from date of confinement, the treatment being continued if necessary into the period of the rains or, say, July 15. This lot over here are very uneven, you say; one of them is an absolute skeleton. The reason is that she was allowed to feed her last season's *toda* for too long a time. It has taken it out of her. She has had no time to recover. I am doubtful whether she should be put to the bull this season, though rightly it is her turn again. All those fourteen *dachis* had babies last year, and are marked down for the *sandh's* embraces in this. Where are their babies? you ask. That little pock-marked fellow there is the only one left. The remainder died of *cheechak* and *gal sujh*. We will deal with babies' diseases presently. Don't imagine you are being brought out to see a successful venture. The reverse is the truth. But failure carries instruction in its train. You need qualities of perseverance when you are dealing with the camel. He will repay you in the end.

We have not been here above fifteen minutes when we become conscious that a revolution is taking place in our midst. *Dachi Sohni*, fifteen years of age, a knowing old thing, and about to become a great-grandmother in our farm, is plainly excited. So are some of the others. Presently the whole farm, acting, apparently, under a single purpose, congregates in the main *nullah*, which runs for a mile in a straight line, and commands a view of the track on the *nullah* bed, along which the *sandh* must make his entry to the *rakh*. *Sohni* is a little in advance of the remainder, who cluster round her, shoulder to shoulder, huddled up closely, almost trampling on one another, in much the same way as you may have seen bees swarming on the branch of a tree. We rush up the crumbling slopes of the *nullah*, bringing all establishments with us. We look

down the *nullah*, and there, far away, almost out of sight, we can see, looking like a speck, what we know to be the *sandh* being led up on a rope by his camelman. The Risaldar-Major, who is a splendid horseman, vaults into his saddle, showing little sign of the thirty years' service behind him, and gallops down the *nullah* to order the sarwan to release the *sandh* and remove his nose rope. He will not require any equipment for the next three months, and we now propose to show the reader a little nature unassisted by human art, to which, however, we will presently need to have some recourse. The sarwan scrambles out of the *nullah* and runs along the bank to join us. The Risaldar-Major has returned. The *nullah* is empty, save for the *dachis* beneath us and the *sandh*, still 5 furlongs away, advancing towards us in majestic isolation. We can just catch the sounds of his trumpetings, borne to us on the wings of the fresh morning breeze. Sohni now also begins to advance towards him, followed by the whole farm, still huddled together swarming, necks interlocked in some cases, a most weird procession, yet with something of dignity attached to it. How quickly the *sandh* seems to be approaching now! We can distinguish him easily without the aid of our field-glasses. He is trotting towards us, but stops every 50 yards or so to issue a hurricane of trumpet-blasts. Sohni is also moving much faster. She has begun to trot. So have the whole farm, still keeping close together and treading on one another's heels in ridiculous fashion. We accompany them, ourselves walking along the bank of the *nullah*. Only 50 yards separate the bull from the herd. The *sandh* comes to a full stop, and challenges all the elements in a thundering trumpet of sound. Sohni also comes to a full stop. Her gentle companions take up a little more ground; they are not quite so densely packed. A few of them even pretend to graze on make-believe weeds, which do not, however, exist outside an imagination hastily conjured up for the occasion. Sohni is meditative. She knows she is about to resign her leadership, which, in

the absence of a protector of the stronger sex, she has been exercising undisputed for the past nine months. But that thought does not distress her. She is very happy indeed, and her joy infects the others, who will still take their cues from her for a few more minutes. The *sandh* is oppressed with an attack of shyness. The interval of 50 yards is not reduced. He also pretends to graze on sand, then recollects himself, and emits a glad roar by way of serenade, and tries grotesquely to dance, turning round and round on his forehand, with quarters lowered and hind legs wide extended. It is a foolish exhibition, but Sohni and her companions do not think so as they gaze in rapt admiration.

The time for these little observances, so dear to the heart of a camel, passes, and Sohni, exerting her prerogative of leadership for the last time for three months, advances demurely, followed by the rest, now moving in extended order. The bull changes his tune to one of welcome in a gentler strain. His neck is bent back to its utmost limit, and the base of his head reposes on his hump. A sudden dash forward, and almost before we can realize it he is lost to view beneath the arched necks of his brides and their sisters and cousins. For ten minutes we scarcely see him as they throng around him.

The bull, soon intent on his newly acquired rights, turns inquisitive, and a very remarkable thing occurs. All those *dachis* which I pointed out to you just now as being pregnant leave the group, walking away with their tails up in the air, and take up a second position at some twenty yards' distance, assuming the rôle of spectators, to regard with interest and approval, clearly indicated in their expressions and outstretched necks, the event that is about to follow. The remainder, including all the young stock, remain with the bull. (Subsequent visits do not interest the herd so much, but the first act of copulation holds them absorbed in contemplation.) It is now time for us to clamber down into the *nullah*. We will let him select his own partner to-day, which will, however, be an elderly and

matured *dachi* (the *dachi* can first be put to the *sandh* at four years of age), and will place her on all-fours on her knees and hocks. She is lymphatic by temperament, and is guided solely by the instinct of reproduction. She will have to be tied down. (This is not always necessary, but is done as a precautionary measure.) Copulation will then take place *more canum*, and not as is sometimes supposed, the *sandh* reposing on his quarters with forelegs spread. The services of a stud groom are necessary. The congress lasts upwards of fifteen minutes, with little perceptible motion. The writer has noted a barren conjunction which endured for forty-five minutes, and the pair had to be divided by the camel-herd. The main body of the dromedarial penis seems to be preceded by a membrane of some length, which acts as a vanguard or feeler. It is this feeler which engages the stud groom's attention. The pair in conjunction during this initiatory encounter are nearly screened from view under an archway of necks. The *sandh's* palatal bladder comes in for a vast amount of attention from the on-lookers.

The act over, we accompany the herd back to the *rakh*. The *sandh* does not lead them on this his first walk with his new companions. He is now trumpeting forth a triumphant anthem. He wanders from one to the other, taking inventory of his harem, receiving a little welcome from each and all, including those pregnant *dachis* who, at a discreet and safe distance, acted as chaperons for him during his first embrace. They still lift their rudders on his or our approach. A *dachi* is said always to do this if pregnant. Camelmen judge of slips and miss-fires in absence of this gesture. The writer's very small experience supports the prevailing notion. The gallantry which he will extend to the latter is delightful to see. He knows they will not require his service, but he is not the less polite on this account; and accords his protection to the whole herd, and is friendly to the children. Indeed, bright days are in store for the occupants of our farm, who will not often be out of his sight.

For himself, he will not eat, any more than any other camel in *masth* will eat. He likes to take up his position on an eminence, from which he can issue his trumpet-blasts of defiance to fancied competitors for his privileges who might be lurking round the corner with a purpose to deprive him of them. Some of the male young stock receive short shrift from him, and keep out of view at a safe distance. This is a good thing, for they have been worrying their female relations lately, and are too old for a girl-school. They should leave the farm at four years of age, to be attached to some good, reliable camelman, who will not load them for two years, after which they can pass into the ranks of our corps. Not only will the *sandh* watch over the herd by day, but good camels have been known to pass the night on sentry duty.

We may have to grant him a second indulgence on this his first day in the farm, again with a partner of his choice. After this he will settle down, and his visits will be regulated and apportioned out under the farm supervisor's arrangements.

March comes along, when you will find some of your pregnant *dachis* uneasy. Let them go off by themselves, which is what they want to do. They will find a secluded thicket in which to conceal themselves for their approaching confinement. Should you run across one lying on a bed of *hermal* under the shade of a cluster of *chichrahs*, you must look the other way, and pretend you have not seen her. She would not like to be scrutinized now. In a day or two she will march proudly back to the herd with *toda* at heel, to receive the congratulations of her contemporaries, the criticism of our old friend Sohni, who is rather a grudging old lady, and the unqualified approval of the cock of the herd, who will rid himself of another squall of heroics, as if he, forsooth, had had anything to do with the glad event. He will, with a pretty conceit, inspect the baby and ascertain its sex. He has learnt, after a very short association, the right way to please a fair acquaintance. He will acclaim to the world

at large, in a further succession of tornadoes, that it was the finest baby he had ever seen.

We have finished with the farm itself, but we must say a few words about sickness of young stock.

The complaints to which yearlings are ordinarily most subject are constipation, *sool* (colic), and *reek* (diarrhoea). The first of these nursery complaints is exceedingly common, and is caused by an over-diet of mother's milk. A well-conditioned *dachi* carries more milk than is good for her *toda*, and the surplus should be drawn off by hand. This is a perquisite of the farm establishments with which you must not interfere. The writer would be sorry to lay down any rules to govern the *toda's* milk-supply. Little and often is the principle to observe. Your good camel-herd, especially if he is a Rewari man, is an expert nursery governess, and you may safely leave these concerns in his hands. You will probably make a mess of things if you try to intervene, and he will certainly resent meddling with what he regards as his own province. Constipation can be very bad indeed, and in some instances has resisted the action of the whole catalogue of veterinary medicines and appliances. The Rewari camelman, in extreme cases, deals with his young charge in characteristic fashion, by slitting its ear with a sharp knife, 2 inches down the centre from its tip. The writer, during his visit to the Maharajah of Alwar's State Farm, saw a case which, after baffling every other measure, yielded to this harsh method of treatment. This can be accounted for by the displacement of the blocking muscle which is produced by the sudden shock to the whole system involved by the operation. At least, this was how it was explained by a veterinary friend to the writer.

The writer's experience is that *sool* and *reek* cases are never fatal or even troublesome in baby camels. They always seem to yield to simple remedies, and are ascribed to precocious grazing. The *toda* tries to copy his mother's example before his stomach is ready for grown-up diet. He does not know what he is eating, and makes silly mistakes.



His mother either does not see what her youngster is about, or, if she does, has not the intelligence to warn him. He arrives at knowledge by experience, and perhaps his mother is wise to leave it at that.

The writer has had exceptional experience of *cheechak* (camel-pox) and what is now believed to be its complication, *gal sujh* (abscess of the throat). In two successive years he lost six out of eight and thirteen out of fourteen promising yearlings from this foul pestilence. *Cheechak* does attack adult camels, but the writer has never seen a case. It is essentially as a baby's disease that he knows it. It attacks them in August and September, when they are from four to six months of age. The early symptoms are to be found in the *toda's* behaviour. Instead of following his mother at heel when she is grazing, he sits down in the water-courses below and bleats pathetically. If his mother wanders out of sight over the crest of the knoll, he does not attempt to follow in her path, but sets up a piteous whining until she comes back, or perhaps struggles painfully along the sand round the base of the hillock on which he lost sight of her, until he sees her again on the opposite slope, when he sits down as before, but on new ground. Thus he will follow her all day, keeping her in sight from the low-lying ravines. A good mother will remain with her child, or return to him constantly, to offer him the consolation of her teats. She knows of no other solace. The little hump, the formation of which we had been observing with such interest, is flattening out again. The hip-bones have become prominent; the spine is in evidence; the limbs, which should be acquiring youthful vigour, are trembling with weakness; it is an effort for him to stand; he presents all the symptoms of the adult in acute surra. The writer cannot time the exact course of the disease, but he believes that the pock-marks first appear from the tenth to the fifteenth day. The handsome little curly coat is sadly defaced. These disfigurements become accentuated, and exude pus. The patient gets worse and worse, and is manifestly suffering torments. Many die

off in the course of the month. At this stage those who survive develop *gal sujh*, in almost every case. The neck becomes pulpy and the throat swells out enormously, like severe cases of dumb rabies in dogs. The helpless little creature suffers fearful distress, and cannot bleat. Death is now a mercy to be prayed for, and it generally supervenes in September, a few cases lingering into October. The writer has only seen three recoveries, and none of these had developed the *gal sujh* complication. A veterinary friend came to our assistance very kindly during the second year's epidemic. He performed two operations on the throat, to relieve the *gal sujh* symptoms, but they were not successful. He conducted two post-mortems, one on a case that ended fatally while we were there, and the other on a dying patient which was destroyed for the purpose. The result of these post-mortems was apparently to establish *gal sujh* as an acute complication of *cheechak*. The inside of both carcasses showed that the interior organs were affected in exactly the same way as the outer skin. The lungs in particular were full of pus, and the patients must have suffered agonies of torment. The abscess in the throat is probably the last stage of the disease. It is indeed a frightful disease in the young; it seems to yield to no treatment. Although this disease apparently cannot be cured in young stock, it is said that it is successfully anticipated by skilled camel-doctors in the south. It is stated by the latter that all young camels must go through it, and that it is only fatal when incurred during the monsoons. Acting on this assumption, they carry about with them small pill-boxes, in which they store scabs picked off adult sufferers. With these scabs they proceed to inoculate young stock shortly after birth, by a rough method of knife-incision on the lip. This gives the *toda* the disease at once, and it runs a mild course, which it completes before the rains break. There are no complications of *gal sujh* or interior inflammation, and the *toda* is scarcely affected, and is said to gain immunity in future epidemics.

The writer would have very much liked to put this to

the test. But the breeding-farm was abandoned shortly afterwards as a corps enterprise, and the remnants of stock distributed throughout the troops. It was impossible to continue breeding in a surra zone, and the writer failed to obtain facilities elsewhere. Surra had been found among the *dachis*, probably imported by brood stock purchased in Kaithal the year before. Moreover, the writer felt instinctively, although he could never produce a shred of evidence to that effect, that there was some fatal influence at work on the banks of that river which would, if only it could be fixed, account for the havoc played by *cheechak* on those promising babes. He has seen private owners' young stock on the Salt Range which were stated to have incurred this disease during the rains. Yet they were not killed by it. Their owners said it was *thandi-ki-bimari*, and thought nothing of it. This is not in accordance with the down-country theory, and, if true, is further evidence that the Salt Range is the place for the camel.

It might be thought, after the writer's sickening experience in attendance on the extinction of nineteen out of twenty-two most promising youngsters by a painful and lingering death, that he would not be an advocate of any privately organized form of camel-breeding. But he has said that perseverance is an indispensable quality to bring to bear on all dealings with the camel. The Indian camelman is prone to give in. He is a fatalist by extraction.

Not only is the writer a convinced believer in the possibilities of organized camel-breeding, but he stakes the future of the camel on the successful issue of such a venture. But there must be facilities.

Given the unfettered control of 3,600 acres of the best grazing in the Salt Range, and the grant of 18 squares of land, or about 500 acres, when available under existing canal schemes, a breeder would be justified in ear-marking the sum of Rs. 15,000 with which to launch a camel-breeding project. These figures are calculated on an ultimate complement of ninety brood *dachis*, at 40 acres of grazing for each *dachi*, and 1 square to every group of five *dachis*.

The breeder would start gradually with eighteen *dachis* his first year, working up to forty-five in his third, if he is sure he has his farm in control. Five or six years might pass before he felt secure in purchasing up to his full complement. He would take care that there were no such fatal diseases as *cheechak* in his path, and if he found any he would order a halt until he had disposed of them.

He would certainly divide his grazing *rakh* into two equal portions, bringing each into use in alternate years, and he would net some handsome profits to the credit of his new enterprise by selling grass.

He would probably also divide his squares into two equal shares, cultivating each block in alternate years and selling the produce. The area not under cultivation would be available for the sowing of *taramira*, *sirson*, and *moth*, and produce of this would find its way into the bellies of his farm stock. He would no doubt consider the advisability of planting, in one corner of his estate, a grove to include *khikar*, *sareen*, and *kareel*, three valuable forms of camel diet which will not be found on his Salt Range *rakh*. And as these are slow growers, he would have a temporary enclosure of the fast-growing *drek*, together with some *tuth* to carry on with.

*Dachis* feed all the year round, and do not have periods of starvation, as camels do when *masth*.

A breeding-farm provided for as above would make the *rakh* its headquarters, and would migrate between its *rakh* and its farmlands at fixed seasons. July to September would find them all safely segregated on their *rakh*. In October and November they would be filling themselves with *moth* down below. In December and January, when the sap is down, they must get back to their *rakh*, which contains two evergreens, *kao* and *phutaki*. In February the *sandh* would be arriving, and our *dachis* had better be divided into two divisions. Those requiring the *sandh*'s service would remain on the *rakh*, while the pregnant animals proceeded to the squares, where they would probably remain until the end of June, supplementing a diet of *taramira*, *sirson*, and some *khasil* with plains grazing from the

*khikar*, *kareel*, and other shrubs. All confinements should take place below, to admit of newly born stock getting their feet hardened and some muscular development in their legs before returning to stony altitudes. The remainder of the farm, having done with the *sandh*, would join their companions in May, and share with them the *poli* thistle and field weeds with which the land will be covered after the harvest is reaped.

The breeder, if a camel corps Commandant, would have a pensioned Indian officer of his corps in permanent charge of the squares, and his serving Indian officers supervising the *rakh* in reliefs of three months. He would probably be well advised to obtain the services, on a good salary, of a Rewari camel-doctor, and his camel-herds would be entertained locally from adjoining villages on a proportion of one camel-herd to every eighteen brood *dachis*, with youngsters thrown in.

He would breed scientifically and to a pattern. He would try and recover the stamp of hill-camel, which, after being driven by forest legislation from its first home in the Salt Range to find a temporary abode in Shahpur and Montgomery, was expelled still farther by canal schemes, finally to lose itself in the regions round Haryana and Delhi.

He would have to pay a high price for these hill *dachis*, and he would not get all he wanted at any price, so he would supplement them by purchases from Alwar, if this is still possible.

It is impossible to say precisely how he would act. We have yet to gain much experience. The former paragraphs are intended to be suggestive only. But the facilities regarding Salt Range grazing and grants of land may be taken to be the minimum requirements, and are fundamental to the launching of a scheme of camel-breeding in the Northern Punjab.

## CHAPTER III

# FRACTURES, DISLOCATIONS, MALFORMATIONS, WOUNDS, AND LAMENESS

## FRACTURES

CAMELS are very liable to fractures due to falls and fighting with other camels.

Fractures of the lower jaw are frequently met with, the lesion usually occurring just in front of the tushes. Fractures of the legs, knee and hock joints result from falls on slippery ground and whilst grazing in hilly rakhs. Fracture of the pelvis and rupture of the muscles occurs from the hind legs slipping outwards.

Though it is much easier to deal with fractures in camels than in cattle, there is usually considerable difficulty in getting a camel to a place where he can be properly attended to, and in most cases it is advisable to destroy the camel, except in cases where the fracture is simple and is situated below the knee or hock.

### Fracture of the Lower Jaw.

In cases of fracture of the lower jaw the camel should not be destroyed, as treatment is usually successful.

The fracture is usually transverse and generally in front of the tushes; it is easily diagnosed by the dropping of the jaw and by the presence of crepitation.

**Treatment.**—The bones must be placed in position, a small quantity of tow applied, and a wooden splint shaped



to fit the part must be adjusted and kept in position by a bandage passed under the tongue. The splint should not be removed for four weeks, and the camel must not be allowed to graze, but must be hand-fed on green fodder for at least six weeks.



FIG. 12.—FRACTURE OF KNEE JOINT WITH PARTIAL ANKYLOSIS.

### Fractures below the Knee and Hock.

After placing the ends of the bone in apposition, the leg should be covered with tow, and strong wooden splints applied and kept in position by strong, narrow bandages dipped in a solution of starch or plaster of Paris and drawn tight, so that the limb is kept perfectly rigid. The camel should be kept tied down in the sitting position and hand-

fed on green fodder. The bandages should not be removed for six weeks, after which time the camel may be allowed to get up. At first the animal will show slight lameness after removal of the splints, but this gradually passes off.



FIG. 13.—FRACTURE OF HOCK JOINT WITH PARTIAL ANKYLOSIS.

## DISLOCATIONS

Dislocation of the hip joint frequently occurs, and is caused by the camel's hind legs slipping outwards. Cases of dislocation of the cervical vertebræ, though rare, are occasionally met with.

**Symptoms.**—Dislocation of the hip joint is always

accompanied by lameness, and the leg appears shorter than the other; when viewed from behind, the difference of the hips is at once apparent. It is differentiated from fracture by the absence of crepitation.



FIG. 14 — DISLOCATION OF THE HIP.

**Treatment.**—Treatment is useless, as a permanent cure is seldom effected. Camels with dislocation of the hip joint are frequently worked by the poorer camelmen, and may continue to work for years.

In cases of dislocation of the cervical vertebræ nothing can be done, and the camel should be destroyed.

## MALFORMATIONS

## Cutch.

This is the term applied by Indian camelmen when the elbow pad rubs against the edge of the chest pad or the skin of the chest wall. It is due to bad conformation. It varies greatly in degree, may affect one or both sides, and is very



FIG. 15.—DISLOCATION OF CERVICAL VERTEBRÆ.

commonly met with. The action of the camel is interfered with, his pace becomes slower, and he gets more quickly fatigued. The condition goes from bad to worse, usually ending in a suppurating wound of the pads.

**Treatment.**—Nothing can be done in the way of treatment. Removal of part of the chest pad does not give

satisfactory results. The friction may be reduced by the application of vaseline or lard.

### Budder.

This term is applied by the natives when there is rubbing of the skin between the elbow joint and chest wall through abnormal turning-in of the elbow or thickening of the skin as the result of mange. The continual friction produces folds and great thickening of the skin and frequently ends



FIG. 16.—CUTCH.

in raw wounds. It is often met with on one or both sides ; the action of the camel is interfered with, though not to such an extent as in the case of cutch. Nothing can be done in the way of treatment.

### Ruggi.

This term is applied by natives when the tendon, instead of passing over the centre of the hock, slips to one side when the camel is sitting down. It is commonly met with, and renders the camel incapable of rising under a load ; in some cases, when the slipping is considerable, the camel is unable

to get up under the weight of two men. Natives of the Punjab fire along the course of the tendon and on each side of the hock, but very little benefit is derived therefrom; still, beyond blistering and firing nothing can be done.



FIG. 17.—RUGGI, SHOWING SLIPPING OF TENDON TO ONE SIDE OF THE HOCK.

### Girki.

This term is applied to a deformity affecting the fetlock, and is met with amongst camels bred in stony areas.

**Etiology.**—The cause of the disease is the nature of the ground in which the camel is bred, though natives of the Punjab attribute it to the milk, due to the mother eating certain plants (Leese).



**Symptoms.**—The disease makes its appearance in young camels about three months old. The fetlocks are noticed to be bent inwards, and as the disease advances enlargement of the fetlock joint becomes manifest. The knee joints may also be affected, and in severe cases turn inwards to such an extent as to rub one against the other. Lameness varies in degree.

**Treatment.**—Treatment consists in removing the young camel from areas containing a large number of loose stones to non-stony districts until the bones are sufficiently strong to withstand the strain imposed on them; this age may be taken as nine months to a year.

## WOUNDS

Camels suffer a great deal from wounds, the chief causes of which are badly fitting saddles, bites from other camels during the "must" period, thorns in the feet and eyes, and the tearing out of the nose peg. The Punjabi camelmen's method of treating wounds consists of the application of mud or burnt rags, the result being that there is no exit for the pus and it burrows internally. The pyogenic bacteria are taken up by the circulation, carried along by the bloodstream, and become lodged in the internal organs; hence the reason why we find on post-mortem so many cases of abscess of the lungs, kidney, etc. In dealing with wounds in the camel, we must treat them with as much care and attention as in the case of any other animal.

### Wounds resulting from the Palan, or Saddle.

Unless attention is paid to the fitting of the palan and to the loads—*i.e.*, that the load is properly balanced and does not sway about—it is only a matter of time before the camel is badly galled and becomes unfit for work.

A great mistake is made by the military authorities in sending camels on service with new palans; it would be far

better to send the old palan that has shaped itself to the camel's back. Material and palan-makers could always be sent with the camels to do repairs when necessary.

Wounds from palans are principally due to badly fitting palans, badly made (too hard or too flexible), keeping the palans on the camel for too great a time, want of inspection with regard to whether the palan needs restuffing, whether the load is evenly distributed, whether the withers are being pinched, whether the palan does not "work" too far back, and whether the load is not too heavy for the palan. To avoid galls from palans, each palan should be numbered according to the camel, and the same palan should always be used for the same camel; chopping and changing about palans should not be allowed. If new palans have to be used, the marches should be short to begin with, and the loads light; by this means the new palan will shape itself to the back of the camel without galling the animal. If, however, long marches and heavy loads are at once attempted with new palans, sore backs are bound to result in a large majority of cases. After the end of the march, the palan should be carefully inspected, as also must be the back of the camel, and any necessary alterations made. If the back has been rubbed, the camel must not be used till all inflammation and tenderness have disappeared. Attention should be paid to the wooden supports of the palan to see that they have not got loose; also it should be seen that no part of the load has been placed on the hump.

Wounds resulting from badly fitting palans are usually found in the region of the withers and the loins, especially that part of the back which comes in contact with the edges of the palan. The wounds may vary from slight abrasion of the skin to large suppurating wounds affecting the bones of the withers and the loins, and very often these wounds are found to be swarming with maggots. If there is only slight abrasion of the skin, no palan should be put on the camel till the skin has healed. The wound should be

thoroughly cleansed with a weak solution of phenyl or similar preparation, then washed with clean water and dressed with boro-iodoform, zinc oxide, zinc ointment, or other simple wound dressing.

If suppuration has taken place, the wound should be thoroughly opened up and efficiently dressed with antiseptic solutions and plugged, so that healing will commence from the bottom of the wound and not from the top.

If suppuration has taken place, but there is no discharge of pus outwardly, the part must be poulticed or a red iodide

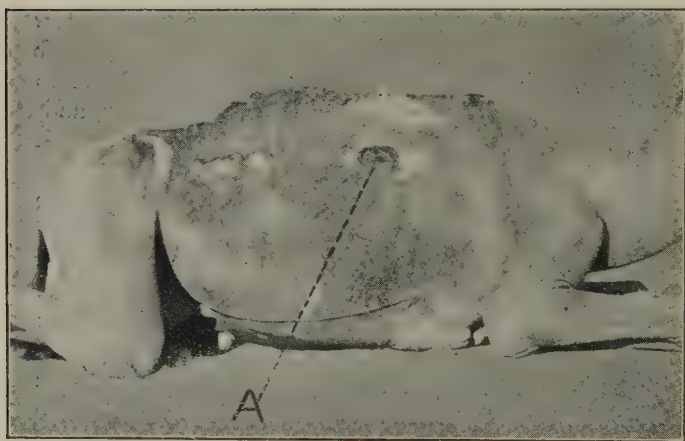


FIG. 18.—SADDLE GALL (A).

of mercury blister applied, and after a couple of days an incision made so as to allow free exit of the pus. If the bones have become affected, all pieces of necrosed bone must be removed. In cases of this kind it is useless making small incisions; the part must be well opened up and thoroughly dressed with weak antiseptic solutions.

Although it is often asserted that wounds in the camel do not readily heal, this statement is inaccurate; wounds in the camel, if properly treated and carefully attended to, heal

rapidly. In using antiseptics care should be taken that only very weak solutions are employed ; it is a common error for too strong solutions to be used in treating wounds.

### Wounds from Bites.

During the "must" season camels frequently bite one another. The most common parts to be bitten are the scrotum, head, hump, and legs. The bite from a camel is serious ; the tushes make a deep wound, and unless the wound is attended to at once, suppuration usually occurs. The scrotum is frequently bitten, the incision being often several inches in length. The wound should be washed with a weak antiseptic or weak solution of iodine and stitched up. The tail must be tied to one side. In cases where the testicles have been severely damaged, they should be removed by castration.

Frequently the lower jaw is fractured as the result of the bite ; in other cases there may be deep wounds or simply skin cuts in different parts of the face and head. In the case of fracture of the lower jaw, treatment as explained on p. 45 must be adopted. With punctured wounds, the parts must be thoroughly dressed with weak antiseptics or weak solution of iodine, and when necessary sutured and a bandage put on when possible. In all cases of wounds our object must be to avoid suppuration taking place, and this can only be accomplished by thoroughly syringing out the part and keeping it as clean as possible.

**Hump.**—Bites in the hump give a good deal of trouble ; they should be treated in the same way as other wounds, but if the palan comes in contact with the wound it is advisable to put the camel off work rather than "chamber" out the palan.

**Legs.**—Frequently the camel bites another camel on the knee or hock joint. In such cases the patient should be put off work. It is not advisable to keep the camel tied down in the sitting position ; he does much better if turned out to

browse. The wound must be carefully treated; in order to prevent suppuration taking place, a bandage must always be applied.

### Wounds in the Feet caused by Thorns.

The camel's foot is comparatively soft, and is easily penetrated by strong thorns such as the gorindah thorn. This



FIG. 19.—THICKENING OF FOOT FROM GORINDAH THORN.

may penetrate the sole or the side of the foot. The gorindah thorn is very strong and about 2 to 3 inches in length. If it penetrates the foot of a camel it causes severe pain and lameness, and produces great inflammation, resulting finally in suppuration and thickening of the whole foot.

**Treatment.**—When camels are grazing where gorindah thorns are prevalent, if a camel is noticed to be lame he should at once be tied down and careful search made for the thorn, which, if found, must be withdrawn, the wound syringed out with an antiseptic solution, and nothing further is required to be done. If the thorn cannot be seen, the foot should be poulticed and the camel kept tied down in the sitting position. If after poulticing for two days the thorn is not found, the camel must be allowed up, and little further can be done till suppuration takes place, when further search must be made and the part treated as an ordinary suppurating wound.

### Wounds in the Eye caused by Thorns.

Camels browse on thorny trees and shrubs. Sometimes while browsing the eyeball becomes punctured by a thorn, resulting often in total blindness. In some cases the eye is only slightly damaged; and, with proper care, the sight may be saved. Treatment consists of fomentations and washing the eye with solutions of boric acid, zinc sulphate, or silver nitrate.

### Wounds resulting from Tearing Out of the Nose Peg.

The leading rope should be attached to the nose peg by a piece of strong string about 8 inches long; if the leading rope is not so attached, any very severe strain on the leading rope will cause the nose peg to be pulled out, with laceration of the nostril. In such cases the edges of the wound must be stitched and the wound treated in the usual way. Care, however, should be taken that the part does not get fly-blown; to prevent this it is advisable to smear the wound night and morning with castor oil.



### Wounds resulting from Maggots.

A small scratch may become fly-blown and full of maggots if not attended to. Owing to the severe strains on the nose peg, slight wounds are produced, which become fly-blown and swarm with maggots, which eat away the flesh. Cases of wounds containing hundreds of maggots are frequently met with, and in some cases the nostrils are totally eaten away.

**Treatment.**—Wounds that have become infected with maggots should be treated as follows: The wound must be



FIG. 20.—NOSTRILS EATEN AWAY BY MAGGOTS.

plugged with a pledget of tow dipped in pure phenyl, creosol, lysol, or turpentine, and this, after a few minutes, should be removed. Many of the maggots will be found killed, and those that are not destroyed will come out from the holes that they have made in the flesh. The dead and the alive maggots can then be removed with forceps. The wound must be swabbed out with tow dipped in phenyl, etc., till all the maggots have been removed. The wound should then be washed with water and plugged up with tow soaked in some antiseptic dressing. The following day the wound

should be again swabbed out with phenyl, and any maggots that were missed the previous day removed with forceps and the wound treated on ordinary principles.

### Wounds of the Soft Palate.

Wounds sometimes occur to the soft palate during the "must" season through camels fighting with one another. Damage to the soft palate may give rise to considerable swelling of this structure, and cause great difficulty in breathing. In such cases the camel should be tied down, the soft palate drawn forward, held between two pieces of wood, and cut clean off with a sharp knife; the animal is then allowed up. The hæmorrhage is on some occasions considerable and at others only slight; the camel, however, does well in the majority of cases.

### Wounds in the Groin.

Suppuration of the inguinal glands is very common. Suppuration of the gland takes place and terminates in a raw wound. Such cases usually are in poor condition; when treated with weak solutions of chinosol, white lotion, black wash, etc., they usually heal rapidly.

### Wounds of the Pads.

The pad most affected is the chest pad. This structure becomes bruised and wounded by the camel being made to sit down for loading and unloading on stony ground instead of soft ground. Owing to the fact that it is almost impossible to keep the wound clean, suppuration usually results, and owing to the structure of the pad it is extremely difficult to get satisfactory healing. Treatment consists in syringing out the wound daily with weak antiseptics, and plugging with tow. Suppurating wounds of the chest pad cause the camel gradually to fall off in condition.

## LAMENESS

Lameness in camels may be due to several causes, the chief being :

1. Cutch (*vide* p. 49).
2. Budder (*vide* p. 50).
3. Rheumatism (*vide* p. 107).
4. Girki (*vide* p. 51).
5. Dislocations and fractures (*vide* p. 46).
6. Gorindah thorn (*vide* p. 56).
7. Sore feet.

If camels are continually worked on hard or stony roads, the soles become very tender and bruised. Instructions should be given to the men in charge to march their camel at the side of the road where the ground is softest, except when it is raining, when the centre of the road should be chosen, as camels are liable to slip on wet, muddy ground. If camels are being worked on hard roads, the feet should be frequently inspected, and any camels showing any tenderness should be given a rest; if continued to be worked, they will soon be rendered totally unfit for work for a considerable time. Sometimes cases of acute lameness are met with. The camel is unable to put the slightest weight on the foot. If the sole be examined a slight swelling about an inch in diameter, which on pressure produces great pain, will be observed. Treatment is very simple. The sole should be washed in a weak phenyl or creosol solution, and a small opening about half an inch deep made in the swollen area. A serous fluid will escape. The sole is again washed in phenyl or creosol solution, and a little dry antiseptic dressing applied to the wound. The foot is put into a "boot" made of sacking; after twenty-four hours the camel will walk sound. The "boot" can be removed after a couple of days.

## CHAPTER IV

### DISEASES OF THE MOUTH, THROAT, AND HEAD

#### DISEASES OF THE MOUTH, THROAT, TEETH, AND EARS

##### Wounds.

WOUNDS in the mouth are not uncommon. They are caused by blows, thorns, and sometimes the gums are partially eaten away by maggots. They should be syringed out with weak antiseptic solutions or, after thoroughly cleaning, applying tincture of iodine. When maggots are found in the gums they must be removed with the forceps, and the wound well syringed out with antiseptic solutions and, when possible, plugged.

##### Leeches.

A slight discharge of blood from the mouth is sometimes noticed. On examination of this region, leeches will be found under the tongue. They are best removed by gripping them with a cloth. Unless a cloth is used, it is difficult to accomplish this, as they slip through the fingers.

##### Irregularities of the Teeth.

Irregularities of the molar teeth are not rare. They are readily detected by examination of the mouth, and are treated by rasping down the sharp edges with the tooth rasp.

### Pus in the Ear.

A discharge of pus from the ear is not uncommon in the camel, and is caused by thorns and bites. Treatment consists of syringing out the ear with solutions of potassium permanganate, chinosol, or other antiseptic. Steel refers to canker of the ear in the camel.

### Æstrus Cameli.

The larvæ of *Æstrus cameli* are found in a cavity above the base of the tongue, and are frequently sneezed out during the month of October and November, especially when the camels are being fed.

On post-mortem this cavity may sometimes be found to contain some hundreds of these larvæ.

### Kapauli.

Kapauli, or chalian, is the name applied when the frontal or maxillary sinus, or both, are filled with pus.

**Distribution.**—It is very commonly met with throughout the Punjab.

**Etiology.**—The cause is not definitely known. Leese attributes it to blows from sticks or from heads of other camels over the frontal region; though this may be a probable cause, it is more than probable that the disease results from surra.

**Symptoms.**—In many cases there is a mucous discharge from one or both nostrils, though in camels suffering from pus in the sinuses there may be no discharge at all. The camel is noticed to hold his head higher than normally. He will avoid browsing off small shrubs, if tall trees are available. He shows great disinclination to feed off the ground, and is adverse to lowering his head to drink. There is a considerable rise in temperature, loss of appetite, loss of condition, suspension of rumination, and often constipation. In advanced cases tenderness is very noticeable on percus-

sion, and instead of a hollow sound, a dull sound, due to the accumulation of pus, is observed. In very advanced cases the pus works its way through the bone and skin.



FIG. 21.—THE POSITION IN WHICH THE HEAD IS HELD IN KAPAU LI.

**Treatment.**—Treatment consists in trephining. Though the animal benefits greatly by the operation, in that he feeds well, etc., it is doubtful whether a cure is ever really effected. The site of operation can be seen from Fig. 22.



The cavity should be syringed out with weak solutions of potassium permanganate or other antiseptics night and morning, and the opening plugged with wool.



FIG. 22.—THE POSITION FOR TREPHINING.

**Post-Mortem.**—Beyond emaciation and accumulation of pus and necrosis of bone, no other lesions may be present. On the other hand, in addition to these, abscesses are frequently found in the lungs, and suppuration of the inguinal and other lymphatic glands is common.

## AFFECTIONS OF THE EYE

The main affections of the eye that are met with in camels are—

1. Opacity of the cornea.
2. Perforation of the cornea.
3. Amaurosis.

Native camelmén are fond of applying dressings to the eye, and do a great deal of harm, their favourite remedies being stale urine and vulture's fæces mixed with glass.

**Opacity of the Cornea.**

Opacity of the cornea of one or both eyes is not uncommon in the camel. It varies from a bluish tint to dense white.

**Cause.**—Opacity arises from inflammation of the cornea, *Thelazia Leesei*, and occasionally from surra, blows, irritants, and the presence of thorns.

**Treatment.**—In cases of opacity resulting from inflammation of the cornea, from blows and irritants, the eye should be protected from the light by either the application of a bandage, or keeping the camel in a shed and applying fomentations and washing the eye with weak solutions of silver nitrate, zinc sulphate, boric acid, or hyposulphite of soda. When due to surra or in cases of long standing, treatment is of little avail, though finely powdered alum proves efficacious in some cases where the opacity is chronic and resulting from inflammation.

**Perforation of the Cornea.**

This is commonly met with in the camel, and is caused by blows and thorns.

Treatment consists in protecting the eye from light, fomentations, and daily applications of weak solutions of zinc sulphate, boric acid, and silver nitrate. In some cases beneficial results are obtained from the local application of calomel.

### Amaurosis.

Cases of total blindness are sometimes met in camels where no lesions in the eye are apparent. This form of blindness is due to paralysis of the optic nerve. Though the lesion may be due to bright sunshine or the reflection of light from white sand, etc., the cause of the affection in the camel is unknown.

**Treatment.**—Treatment consists in the administration of nux vomica and applications of blisters behind the ears.

### Thelazia Leesei.

**History.**—This parasite was first observed in 1910 by Leese in the vitreous chamber of the camel's eye.

**Distribution.**—It is frequently met with in camels in the Punjab beneath the eyelids.

**Symptoms.**—Except when the parasites occur in the vitreous chamber, and give rise to ophthalmia, they do not appear to produce ill effects. The males vary from 6 to 12 mm. in length, and the females from 10 to 21 mm.

## SORE THROAT

Deaths frequently occur from a disease named by the natives of the Punjab *gulgut*.

**Cause.**—The cause of the affection is not known.

**Symptoms.**—A case of this disease which ended in recovery presented the following symptoms:

- First Day.*—1. Off feed and suspension of rumination.  
2. Sitting down, no inclination to stand.  
3. Slight swelling of the throat.  
4. Neck stretched out on the ground and animal evidently in pain.  
5. Breathing slightly rapid.  
6. Slight fever.  
7. Constipation.

8. Eyes dull.
9. Salivation and champing of the jaws.
10. Drank a little water with great difficulty.
11. Examination of the blood revealed no organisms.

The camel was placed in the shade; no medicine was administered, neither was the throat fomented nor liniments applied. Water and green wheat were placed in front of him.

*Second Day.*—Next morning there was very little change; he had drunk a little water, but had eaten nothing; champing of the jaws and salivation had stopped. The temperature was only slightly above normal; a small quantity of hard fæces had been passed. He continued to keep the neck stretched out, and the throat was still painful.

*Third Day.*—The camel was much better. The neck was no longer stretched out on the ground, but held in the normal position; there was very little pain in the region of the throat; the temperature and breathing were nearly normal; the eyes were bright; fæces were passed; he had drunk water and had eaten some green wheat.

*Fourth Day.*—Improvement continued, and on the seventh day the camel was in normal health and was sent on light work.

Another case which presented similar symptoms to the above also recovered. No medicine was administered, but fomentations were applied to the throat.

**Treatment.**—Until the cause of the disease is determined, all that can be done is to treat the symptoms. A dose of Epsom salt (1 to 2 pounds, according to the size of the camel) should be given. Fomentations may be applied to the throat, and green fodder and water arranged in front of the animal. He should be placed in the shade and left alone. If the weather is cold, a blanket should be placed on the camel at night. On no account should the camelman be allowed to force the animal to eat.

Camelmen fire the throat, and maintain that if this is not done the majority of camels suffering from this disease die, and they claim that by firing a large percentage are cured.

## DISEASES OF LYMPHATICS

**Enlargement and Suppuration of the Parotid and other Lymphatic Glands.**

Enlargement and suppuration of lymphatic glands is frequently seen in the camel. In camels suffering from surra, suppuration of the inguinal glands is not rare in the later stages of the disease. Enlargement, suppuration, and calcification of glands are seen in camels that have died of tuberculosis. Enlargement and suppuration of the pre-scapular and parotid glands are not uncommon; the cause is not known, and though in some cases it may result from suppurating wounds, it is probable that it is due to some specific disease. The Punjabi camelman, in cases of enlargement and suppuration of the glands, terms the disease "mallee." When the parotid gland is affected, the chief symptom is difficulty in breathing; the Punjabi camelman's treatment consists in firing the region of the parotid gland. The disease does not appear to be contagious. Sturdy reports a similar disease amongst camels in British East Africa, which he states resembles mumps, the chief and practically only symptom being an acute and extensive swelling of the glands in the region of the throat. The onset of the disease is rapid; there is no rise of temperature, and death appears to be due to asphyxia caused by mechanical obstruction. The disease is of a contagious nature and causes considerable loss. Beneficial results were obtained by free opening of the swollen glands or severe blistering of the affected parts.

## CHAPTER V

### DISEASES OF THE SKIN

#### EXTERNAL PARASITES

THE following are the external parasites of the camel :

1. Ticks (*Hyalomma Ægyptium*).
2. Lice (*Hæmatopinus*).
3. *Sarcoptes cameli*.
4. *Onchocerca fasciata*.

#### Ticks.

Ticks are found under the tail and in the groin. What part they play in the spread of disease amongst camels is not known.

#### Lice.

During the cold weather camels are much affected with lice. Many camels are found to be swarming with them. They cause great irritation. They are best got rid of by three or four applications of solutions of phenyl or creosol.

#### *Sarcoptes Cameli*.

For a description of mange see p. 75.

#### *Onchocerca Fasciata*.

*Onchocerca fasciata* were first demonstrated in the camel by Cleland in West Australia in 1909. They were found in camels in the Punjab in 1910 by Leese. They are fairly



common in the camel, and are found in nodules in the subcutaneous tissue, usually on the neck; they do not appear to cause any harmful effects.

## JHOOLING

Jhooling, or jhoolak, as the disease is sometimes called, is a contagious disease of camels, manifesting itself in the

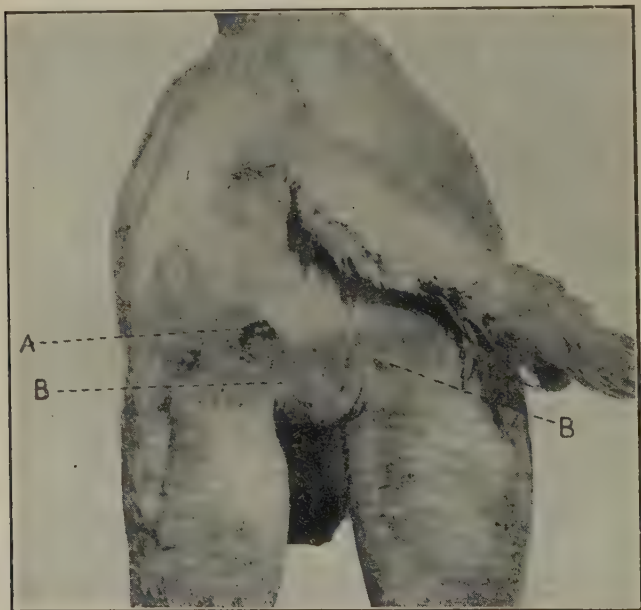


FIG. 23.—JHOOLING, SHOWING (A) RAW PATCH AND (B) SWELLING.

ormation of local tumours, hot and painful, of a fibrous character, and terminating in suppuration and raw patches.

**Distribution.**—The disease is widely distributed throughout the Punjab; it is not so common in the Lahore district as in the Jhelum and Rawal Pindi districts. It usually

occurs in the cold weather, but is met with occasionally in the hot weather.

**Etiology.**—The causal organism has not yet been isolated, though probably it is a fungus.



FIG. 24.—JHOOLING, SHOWING RAW PATCH (A).

**Pathogenicity.**—Inoculation of emulsion of the lesion into horses, cattle, buffaloes, dogs, guinea-pigs, and rabbits, does not produce the disease.

If portions of the lesion are rubbed on the skin, whether the latter be scarified or not, no jhooling lesion is produced in any of the above animals.

Horses, buffaloes, and cattle kept in contact with camels suffering from jhooling do not contract the disease.

When portions of a jhooling lesion are rubbed on the scarified skin of healthy camels, the disease develops after a few days. Positive results were obtained in only one case when the experiment was carried out on the unscarified skin of healthy camels.

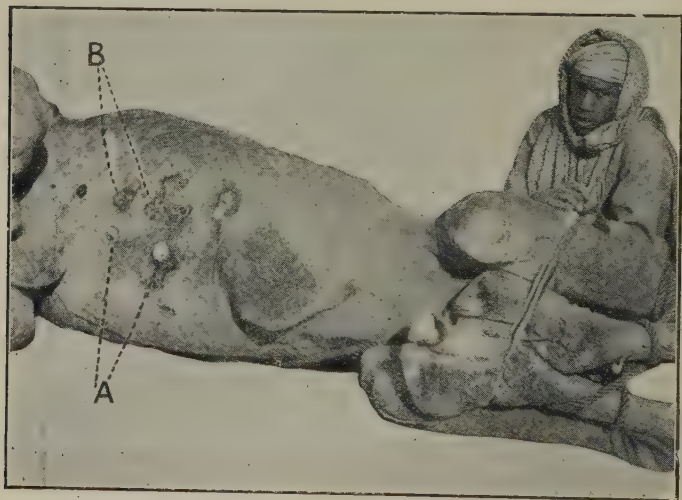


FIG. 25. -JHOOLING, SHOWING (A) HEALED LESION AND (B) PARTIALLY HEALED LESION.

Healthy camels kept in contact with those suffering from jhooling contract the disease rapidly.

**Symptoms.**—The first symptom is a hot, hard and painful swelling varying from 1 to 3 inches in diameter, usually on the neck, hind quarters, or testicles, but the lesions may occur in almost any part of the body. After a few days the swelling becomes very irritable, and if situated in any part of the body that the camel can reach with his teeth, he will gnaw at it, leaving a raw patch. In all cases, after the lapse of some time, suppuration takes place, and

finally the wound heals, leaving a small white patch which lasts for several months. As a rule several lesions are found on a camel suffering from the disease, and the animal loses condition. The lesions take a long time to heal, and if situated in any part that comes in contact with the palan, the camel has to be put off work.

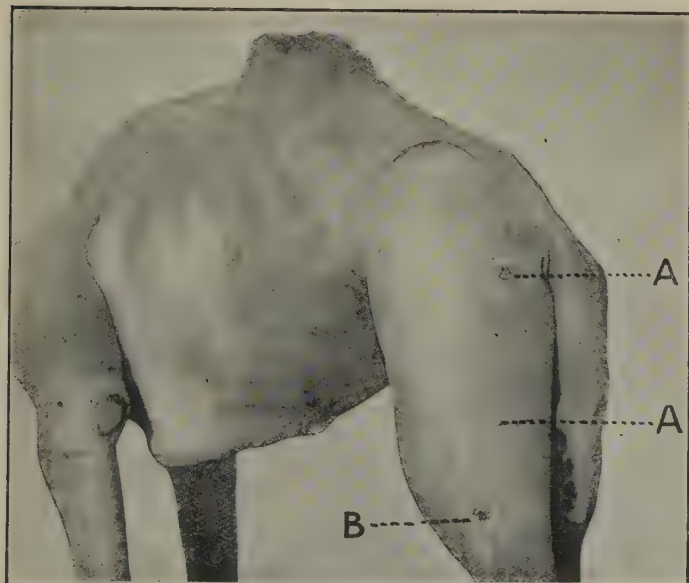


FIG 26.—JHOOLING, SHOWING (A) HEALED LESIONS AND (B) PARTIALLY HEALED LESIONS.

**Anatomical Changes.**—The tumour consists of fibrous tissue, finally undergoing suppuration. Examination of the pus reveals streptococci; no staphylococci have been observed. In camels suffering from jhooling on which I have made post-mortems, no lesions have been observed in the internal organs.

**Treatment.**—I. The best treatment, and one which gives very satisfactory results, is the following: A strong

red iodide of mercury blister should be applied, and after three days washed off with soap and water. The diseased areas should then be excised, and finely powdered permanganate of potash applied. The permanganate of potash must be well rubbed in, and not simply dusted on. Three dressings at intervals of four days are usually sufficient.

2. Sometimes good results are obtained by excising the lesion and then applying pure phenyl or carbolic acid. The following day the wounds should be thoroughly washed with water and then treated with black wash (30 grains calomel,  $\frac{1}{2}$  ounce of glycerin,  $1\frac{1}{4}$  ounces of tragacanth mucilage and lime water to make 10 ounces of lotion).

Camelmen apply boiling ghee and fire round the edges of the lesions, with the idea of preventing the disease from spreading. This treatment cannot, however, be considered satisfactory.

If the lesions are on the testicle or in situations where they can be reached by the tail, the tail must be tied.

**Prevention.**—Camelmen are well aware of the contagious nature of this disease. If they have a camel suffering from jhooling lesions in the neck, this animal is always placed first in the string of camels; whereas if the lesions are on the hind quarters, the affected camel is tied last.

Should a case of jhooling occur amongst a number of camels, it should be at once isolated. The remaining camels should be very carefully examined, and divided up into lots and not allowed to mix. Should more cases be found, they should be at once isolated. The disease spreads very rapidly, and causes a great deal of trouble, so that every effort should be made to prevent the affection from spreading, by careful examination and segregation.

## MANGE

Mange (*kharish* or *pan*, as it is called by natives of the Punjab) is a disease to which camels are very prone. Sarcoptic mange is the only form met with.

**Distribution.**—The disease is met with in all parts of the Punjab, and usually makes its appearance during the cold weather. It is only seldom encountered in the hot weather.

**Etiology.**—The disease is caused by the *Sarcoptes cameli*.

**Diagnosis.**—Mange is easily diagnosed by the symptoms produced and by the finding of the parasite. For the detection of the parasite scrapings of the skin should be made and placed in 10 per cent. caustic potash solution till they have become soft, and examined under a low power. The crusts and scrapings are more quickly softened if the caustic potash solution is slightly heated. On occasions the parasite is readily found, but sometimes it takes considerable time.

**Symptoms.**—There is great irritation, and the camel may be seen biting the affected part, rubbing it with either the fore or hind feet, or against a tree or wall or against another camel, or rubbing one hind leg against the other. As a rule mange starts in the groin and brisket, and gradually affects the flanks, belly, and legs, then the head and neck, and lastly the back. During the cold weather the hair of camels is long, and when infected with mange it falls out and hairless patches are left. Owing to the irritation, the infected parts are gnawed at by the camel, and sometimes raw wounds result.

Frequently in severe cases, and especially in camels that are also suffering from surra, large areas of papules and vesicles are seen very similar to what is observed when a horse has been severely blistered. As the disease continues the skin becomes greatly thickened. The wetter the cold weather, the more virulent is the course that the affection runs.

**Treatment.**—The treatment of mange presents considerable difficulty, owing to the fact that the sarcoptic parasite



penetrates the skin. The animal should be clipped all over, thoroughly washed with soap and water, and the skin cleaned by the aid of a hard brush. In the evening, when the skin is quite dry, a bland oil to which a little sulphur



FIG. 27.—MANGE, SHOWING THICKENING OF SKIN.

is added should be smeared all over the camel. The next morning mud is applied all over the skin, and he may be sent out to browse. On the following morning the mud is washed off, and the camel is again washed with soap and water. After some days the dressing should again be repeated, and

if necessary a third dressing. After clipping the hair, the animal must be covered with a blanket at night. After application of oil the camel should not be exposed to the sun till mud has been applied. If he is smeared with oil and exposed to the sun, the skin is liable to become blistered.



FIG. 28.—MANGE, SHOWING "FOLDS" AND THICKENING OF SKIN.

Satisfactory results in the treatment of mange are obtained with taramira oil (*Eruca sativa*). Care, however, is necessary when this agent is used, and not more than  $1\frac{1}{2}$  to 2 pounds should be applied; the application of this oil causes a rise of temperature and slight loss of appetite, and in debilitated animals death sometimes results. If the camel is suffering

from very severe mange and there are raw wet patches, after the dressing of taramira oil has been washed off and the skin has dried, the application of powdered borax acts beneficially.

Blenkinsop, in his article on the treatment of sarcoptic mange in camels in Hoare's "Veterinary Therapeutics," recommended the following treatment: "The camels should be clipped and, if possible, washed with warm water and soap. When dry, the following dressing is to be applied :

Train oil	-	2 pounds	} Sufficient to dress one camel.
Sulphur	-	$\frac{1}{2}$ pound	
Common salt	-	$\frac{1}{2}$ pound	

This should be removed on the third day, either with warm water and soap or by applying paraffin emulsion (paraffin  $\frac{1}{2}$  to 1 pint, soap solution 1 gallon) and washing with warm water on the fourth day. Three successive dressings usually effect a cure. When near the sea, mange in camels has been successfully treated by making the animals lie in the sea-water and rubbing them with coral. Three or four baths usually prove effective, but it is always advisable to dress the animals at least once with oil and sulphur before discharging them as cured."

Native camelmen are very adverse to clipping their camels in the cold weather, and when the animals become infected with mange they simply apply oil to the affected parts, and not until the hot weather commences do they clip their camels and apply oil all over.

Many Punjabi camelmen not only apply taramira oil externally, but also give it internally in 1 to 2 ounce doses. The gear of mangy camels should be thoroughly disinfected, and the affected animals must be isolated from the healthy. No healthy camels should be camped on ground that has recently been occupied by affected animals.

## URTICARIA

Urticaria is not common in camels, but cases occasionally occur.

The cause of the disease is not known.

**Symptoms.**—Swellings about the size of a shilling, flat, well defined, and oval in shape, and non-irritating, suddenly appear in different parts of the body, principally on the hind quarters and sides of the chest. Beyond the appearance of the swellings no other symptoms are noticeable; the camel feeds well, ruminates, and does not appear to suffer any ill effects.

**Treatment.**—A mild purgative should be administered. The swellings generally disappear within two days.

## CAMEL-POX

This disease is termed by the natives *cheechak*, *matta*, *thandi*, and is very commonly seen amongst camels, especially young camels (1 year old), though the disease is also met with in the aged.

**Occurrence.**—It is found throughout the Punjab, and is most frequently met with towards the end of the hot weather; hundreds of cases are usually met with amongst the young camels at the Batesar Fair in the United Province of Agra and Oudh. Though not so common amongst full-grown camels, it is nevertheless encountered. Though the symptoms are severe, the disease does not cause great mortality and the animal usually recovers.

**Etiology.**—No specific organism has so far been isolated. The relation between camel-pox, sheep-pox, goat-pox, cow-pox, and small-pox, has not been demonstrated.

**Symptoms.**—The first symptom is swelling of the head, with slight fever and slight loss of appetite, and constipation. In full-grown camels the swelling of the head is very pronounced, and there is great difficulty in swallowing; the

swelling is so great that the animal can scarcely see, and the lips become much swollen. An eruption on the lips follows, which develops into vesicles and pustules. The pustules gradually dry and crusts are formed; these crusts finally become detached. The disease varies greatly in degree; sometimes it is mild, at other times very severe. As a rule the affection runs its course in from two weeks to a month.



FIG. 29.—CAMEL-POX, SHOWING ALMOST HEALED LESION ON LIPS.

**Treatment.**—The camel should be put on green food and given a dose of magnesium sulphate. If he will not drink, water must be poured down his throat. The lesions should be washed with weak antiseptic solutions, and when the crust stage is reached boric ointment, zinc ointment, or boro-iodoform ointment, should be applied. Care must be taken that the lesions do not become fly-blown, and to avoid this, application of castor oil night and morning gives excellent results. With careful nursing the majority of cases recover.

## TUMOURS

With the exception of tumours of the chest pad, neoplasms are not very common in the camel, though tumours of the fetlock joint of the foreleg are occasionally seen, and enlargement of the foot from gorindah thorn is of frequent occurrence (*vide* p. 56).

## Tumours of the Chest Pad.

These tumours consist of fibrous tissue, and result from loading and unloading the camel on stony ground. These



FIG. 30.—TUMOUR OF CHEST PAD.

may be very large. In one case a tumour after removal weighed 25 pounds.

**Treatment.**—Treatment consists in excision of the tumour; in many cases this is successful, but in others the hæmorrhage cannot be controlled.

**Procedure.**—The camel is thrown and chloroformed. The tumour is cut clean off with a knife, and hæmorrhage



controlled by means of the actual cautery, forceps, and pressure; owing to the structure of the pad, it is extremely difficult to ligature any of the bloodvessels. The wound is covered with a layer of tow soaked in perchloride of iron, and over this several layers of tow are applied, and on top of this a



FIG. 31.—TUMOUR OF FETLOCK JOINT.

wooden board is placed, the whole being kept *in situ* by a piece of strong sacking, which is drawn as tight as possible by means of thin rope over the back of the camel. The animal must be kept in the sitting position for two days. The hæmorrhage may be severe. After two days the camel is allowed to stand, and the board and tow removed and the

wound treated in the ordinary manner. A large quantity of tow should always be applied; this can be kept in place by sacking tied by tape over the back. The camel may now be allowed to stand or sit as he chooses; it will be found that he will prefer to stand as much as possible until the wound has thoroughly healed. After the removal of the tumour the camel must be allowed as much water as he likes, and should be given green food.



FIG. 32.—AFTER REMOVAL OF THE TUMOUR.

### Tumours of the Fetlock Joint.

These tumours consist of fibrous tissue, but the cause is not definitely known.

**Treatment.**—The best method of removing these tumours is by the elastic ligature. The ligature cuts through in about eight days. The camel is tied down in the sitting position, the ligature fixed, and the animal is then permitted to get up and allowed to graze. After the ligature has cut through, the wound is treated with weak solutions of lysol and white

lotion; the part is then covered with tow and a bandage applied, and dressed daily. Tumours consisting of a "skin sack" containing a yellow fluid and a mass of hair are not infrequently met with. They are usually situated behind the parotid gland, and can be removed by the elastic ligature.

# CHAPTER VI

## MICROBIAL DISEASES

### RINDERPEST

OUTBREAKS of rinderpest do not occur amongst camels with the same frequency as in cattle. Tartakowsky states

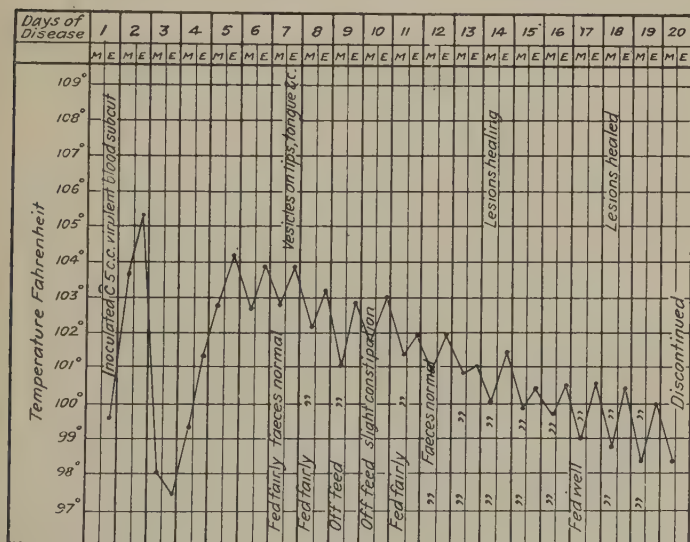


FIG. 33.—RINDERPEST.  
Camel No. 2, one year old.

that camels are only slightly susceptible and very seldom die of the disease. Occasionally deaths from rinderpest are

reported by the commandants of Silladar camel corps. To determine whether the camel is susceptible to the disease, three camels (1 year, 6 years, and 12 years old) were inoculated with rinderpest virus, and two calves 11 months old acted as controls. The 1 and 6 year old camels developed typical symptoms of rinderpest, but recovered; the 12-year-old camel, with the exception of loss of appetite, slight

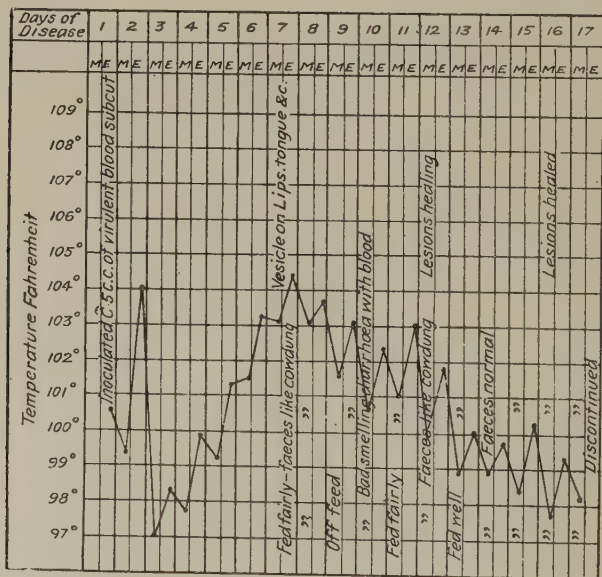


FIG. 34.—RINDERPEST.  
Camel No. 1, eight years old.

diarrhoea, and a slight temperature reaction, developed no symptoms; the two calves which acted as controls, on the other hand, only showed a temperature reaction. The only conclusion to be drawn from this experiment is that the camels were more susceptible to rinderpest than these particular calves used in the experiment.

**Etiology.**—The disease is caused by an ultravisible

organism. The blood and all excretions, with the exception of the bile, are infective.

**Symptoms.**—The symptoms in the camel are very similar to those seen in cattle. There is high fever, suspension of rumination, loss of appetite, followed by trembling of the muscles, restlessness, grinding of the teeth, watery discharge from the eyes, coughing, and diarrhœa of a fœtid character and mixed with blood and mucus. On the sixth to seventh day after inoculation vesicles appear on the lips, dental pad, and tongue, the vesicles finally becoming ulcers. The course that the disease ran in the two experimental cases is shown by the charts on pp. 85 and 86. One notable feature was the rapidity with which the lesions of the lips, tongue, and dental pad healed, and the fact that in one camel there was no diarrhœa.

With regard to post-mortem appearances, preventive treatment (serum inoculation), etc., further investigations are necessary.

## SURRA

Of all the diseases to which the camel is susceptible, surra causes the greatest number of deaths, and, according to Pease, 25 per cent. of all the camels in the Punjab are suffering from surra.

**Definition.**—Surra is an acute protozoan remittent fever, accompanied by emaciation, anæmia, and debility, and characterized by the presence of trypanosomes in the blood during the paroxysm of fever.

**Synonyms.**—Surra, meaning *rotten*, is the most widely used term for the disease; other common names for it in India are Pithgaya, Purana, Tibirsa, Sarhgaya, Kanahogaya.

**History.**—The disease was first discovered by Griffith Evans in 1880 at Dera Ismail Khan, when he demonstrated the trypanosomes in the peripheral circulation of affected camels.

**Etiology.**—The cause of the disease is a flagellate—*Trypanosoma Evansi*. The trypanosome belongs to the



class Flagellata of the protozoa. It consists of an elongated body, undulating membrane, and a flagellum. It is  $20\ \mu$  to  $40\ \mu$  in length and 1 to  $1.5\ \mu$  in width. It is actively motile, and by reason of its size and motility can be easily seen in wet films of blood under a low-power objective. In dry preparation the organism is readily stained by Giemsa or Leishman's method.

In the camel we meet with two forms of surra :

1. The acute form.
2. The chronic form.

The latter is the most prevalent. In the acute form the disease runs a rapid course, the animal dying in a few months. In the chronic form the disease is of long duration, the animal lingering on for one to three years, becoming gradually more and more emaciated and debilitated, till he finally becomes nothing but skin and bone.

**Diagnosis.**—In the diagnosis of surra it must be remembered that the trypanosome only appears in the peripheral circulation at intervals, and when it does so it is accompanied by paroxysms of fever. It is only very exceptionally that trypanosomes will be found in the peripheral circulation without the camel showing a morning temperature of  $99^{\circ}$  F. or over. Before we can make certain that a camel is suffering from surra the trypanosome must be found in the blood, and to demonstrate its presence a wet-film preparation must be made and examined under a  $\frac{1}{6}$ -inch objective, or a smear of the blood must be taken and stained.

*To prepare a wet film*, a very small portion of the edge of the ear is cut with scissors and the part squeezed till a small drop of blood exudes. To this drop of blood is applied a clean cover-glass ( $\frac{1}{4}$  inch square is a suitable size), so as to get a small drop of blood in the middle of the cover-glass. Then apply the cover-glass to a clean slide (3 inches by 1 inch is a suitable size). The blood will then be between the cover-glass and the slide, and will run out to the edge

of the cover-glass. Too large drops of blood must be avoided, or there will be difficulty in detecting the trypanosome. The film is then examined. A north light is best. If trypanosomes are present, they will be seen wriggling about amongst the corpuscles. The movement of the trypanosomes becomes gradually slower, till it finally ceases altogether after about half an hour, under ordinary conditions of temperature.

*To prepare a smear for staining*, touch the drop of blood on the ear with a clean glass slide  $\frac{1}{2}$  inch from the end of the slide. Apply the edge of another slide across the drop of blood, and draw the second slide along the length of the first. The first slide should then be waved to and fro until the blood has dried. The smear can be examined at leisure after staining by Leishman's method.

*Leishman's Method.*—In this method the smear is fixed and stained at the same time. The stain can be bought in powder or tabloid form. The latter is very convenient, all that is necessary being to dissolve one tabloid in 10 c.c. of alcohol. To stain the smear, drop on it a few minims of the stain, allow this to remain for one minute, then add double the quantity of water, and shake the slide to insure the water and stain mixing. Allow the stain to act for fifteen minutes to half an hour, then wash with water and dry with blotting-paper, and examine under the  $\frac{1}{12}$ -inch oil immersion. When using  $\frac{1}{12}$ -inch oil immersion it must not be forgotten that a condenser is necessary.

After the blood has been taken, to the edge of the ear that has been cut a little pure carbolic acid on a cotton-wool plug should be applied to stop any bleeding. If this is not done, flies are attracted even by this very small wound, and may transmit surra from a surra-infected camel to the healthy one by mechanical means.

After using the scissors on one camel, they must be disinfected in a weak solution of carbolic acid and thoroughly dried before being used on a fresh camel.

*The Detection of Surra in a Large Number of Camels.*—It has

already been stated that the trypanosome only appears in the peripheral circulation during the paroxysm of fever, and that these paroxysms occur at intervals varying from about a fortnight to several weeks. Although no trypanosomes may be present in the peripheral circulation on one day the camel cannot be declared free from surra; all that can be said is that on that particular day the blood is free from trypanosomes. To detect surra the examination must be continued daily for several weeks; but if a commandant of a camel corps has a large number of camels under his charge, he will at once state that it would be impossible to examine the blood of every animal daily. This is perfectly true, and could not be done; but if it be remembered that the trypanosome only appears during the paroxysm of fever, all that is necessary is for the temperatures of all camels to be taken every morning, and only the blood of those showing a temperature of  $99^{\circ}$  F. or over need be examined. If ten half-minute thermometers are used, the temperatures of ten camels can be taken in half a minute. Allowing another half a minute to permit the temperature being read, etc., the temperature of, say, 300 camels could therefore be taken in half an hour. It is imperative that the temperatures should be taken daily if all cases of surra in the corps are to be diagnosed. It is obvious from what has been said that by carrying out the examination of the blood in a spasmodic manner cases of surra are sure to be missed.

**Symptoms.**—1. *In the acute form* the disease runs a fairly rapid course, death taking place within a few months. The paroxysms of fever occur frequently. There is a watery discharge from the eye, and this organ instead of being bright is dull. The animal goes off his feed and becomes quickly tired at work. The hump becomes rapidly smaller. Sometimes there is œdema on the pads and on the abdomen and sheath.

2. *In the chronic form* the paroxysms occur at longer intervals than in the acute form. The animal is noticed

periodically to go off his feed. The eye is dull. The animal becomes gradually thinner and more debilitated, till finally he is nothing but skin and bone, the hump having disappeared and the thigh muscles having atrophied. Paralysis and pneumonia are frequently seen in chronic surra cases, and œdema on the pads and on the abdomen is also sometimes met with. In dachis infected with surra abortion is common.



FIG. 35.—CAMEL SUFFERING FROM SURRA.

Very few cases of chronic surra recover. The generally accepted view is that if the camel lasts over three years he will recover.

**Post-Mortem Appearances.**—On post-mortem there are no characteristic appearances in camels dead from surra, evidences of extreme emaciation only being observed.

**Disposal of the Carcass.**—All camels that have died of surra should be at once burnt or buried; the trypanosome may remain alive from twenty to thirty hours in the blood

and lymph, and in order to prevent dogs, etc., from eating the carcass and becoming infected, and crows and ordinary flies from spreading the disease to healthy animals by mechanical means, the carcass should be burnt or buried as soon as possible.

**Treatment.**— The treatment which gives the most successful results, though the percentage of cures is small, consists of five doses of 5 per cent. solution of soamin (injected subcutaneously) and five gradually increasing doses of arsenious acid, 1 per cent. solution (injected intravenously), or by arsenic alone (ten gradually increasing doses). The soamin and arsenious acid are injected alternately, with an interval of one day between each injection. Leese obtained a certain number of cures by a combination of sodium arsenate, soamin, and arsenic.

The tolerance of the camel to arsenious acid is very variable, but from experiments that have been carried out it was found as a rule that the largest dose that can be safely given is 1·2 grammes per 1,000 pounds body-weight. The following doses should be given :

- 1st day: 100 c.c. of a 5 per cent. solution of soamin subcutaneously.
- 3rd day: 0·6 gramme of a 1 per cent. solution of arsenious acid intravenously.
- 5th day: 100 c.c. of a 5 per cent. solution of soamin subcutaneously.
- 7th day: 0·8 gramme of a 1 per cent. solution of arsenious acid intravenously.
- 9th day: 100 c.c. of a 5 per cent. solution of soamin subcutaneously.
- 11th day: 0·8 gramme of a 1 per cent. solution of arsenious acid intravenously.
- 13th day: 100 c.c. of a 5 per cent. solution of soamin subcutaneously.
- 15th day: 1 gramme of a 1 per cent. solution of arsenious acid intravenously.
- 17th day: 100 c.c. of a 5 per cent. solution of soamin subcutaneously.

19th day: 1·2 grammes of a 1 per cent. solution of arsenious acid intravenously per 1,000 pounds body-weight of the camel.

If arsenic alone is given, the doses should be 0·6, 0·6, 0·8, 0·8, 0·9, 0·9, 1·0, 1·0, 1·2 and 1·5 grammes.

The camel should be given good grazing and a liberal ration. Should the animal go off its feed after any dose, the next dose should be postponed till he is feeding well. Colic should be treated by chlorodyne in doses of 3 ounces in 1 to 2 pints of water (of chlorodyne containing 1 grain of morphia per fluid ounce). Constipation should be treated by 1 to 2 pound doses of Epsom salt dissolved in water.

The solutions must be freshly prepared and sterile, and filtered before being injected. They should be injected at blood heat by means of an Ehrlich's injection flask. Should an animal relapse after treatment, he should be submitted to the treatment again.

**Method of Spread.**—In order for surra to spread two factors are necessary :

1. The reservoir (*i.e.*, a camel infected with surra).
2. The transmitting agent (*i.e.*, blood-sucking flies, the most important of which as transmitters are the Tabanidæ, termed by the natives of the Punjab *bara dang*).

If either of these two factors are wanting, the disease cannot be spread from the surra-infected animals to the healthy. If, on the other hand, there is a surra-infected camel amongst a batch of healthy camels and Tabanidæ are present, the fly while sucking the blood (containing the trypanosome) from the surra-infected animal may be dislodged and attack a healthy camel; during the act of biting this camel, he inoculates the latter with surra. This is known as direct or mechanical transmission. It has been proved by experiment that surra can be transmitted in this way, and under favourable conditions (*e.g.*, when camels, amongst which are surra-infected ones, are herded together and blood-sucking flies are present) there is no reason why the disease should not be transmitted in this way; but



whether this is the usual method of transmission or whether the trypanosome does not undergo a cycle in the fly is still undecided. It has been shown with reference to sleeping sickness that flies are capable of infection twenty days after they have fed on an infected host; and the majority of workers on sleeping sickness agree that direct transmission seldom occurs.

If direct transmission is the means by which surra is spread from camel to camel, any blood-sucking fly may transmit the disease, and considering the number of blood-sucking flies in India and the number of reservoirs of surra, it is difficult to imagine that a single camel could have escaped becoming surra-infected. The spread of surra is probably at times by direct transmission, but generally not. It is probable that the trypanosome undergoes a cycle in the fly (and in a particular species of fly only), a percentage only of these flies being capable of infecting healthy camels—*i.e.*, the cycle is not completed in every one of the flies that has fed on blood containing trypanosomes.

The principal blood-sucking flies are:

Tabanidæ.  
Stomoxys.  
Hæmatopota.  
Hæmatobya.  
Philæmatomyia.  
Simulidæ.  
Lyperosia.  
Hippobosca.

From practical experience there is no doubt that the most dangerous flies in the spread of surra from camel to camel are the Tabanidæ.

**Life-History of Tabanidæ.**—The mature fly lays its eggs on the under surface of leaves of trees or blades of grass overhanging water, in masses of 500 eggs. These egg masses are white when fresh, but after a few days they become brown. From these eggs a larva is hatched out; this drops into the water and buries itself in the mud

towards the edge of the pool or bank of the river, and finally becomes a pupa, from which the mature fly emerges. The Tabanidæ are most prevalent in the plains in July, August, September, and beginning of October; in the hills in May, June, and July. There are three broods of flies in the year—roughly, one in March, one in July, and one in October. They are, however, most prevalent during July, August, and September, but the time they appear and disappear depends upon climatic conditions.



FIG. 36.—A GROUP OF SURRA CAMELS, SHOWING THE WASTING OF THE MUSCLES OF THE HIND QUARTERS.

**Prevention of the Spread of Surra.**—As has already been stated, for the spread of surra two factors are necessary:

1. The reservoir of infection (*i.e.*, a surra-infected camel).
2. The transmitters (*i.e.*, blood-sucking flies).

If either of these two factors could be got rid of, we could eliminate the disease; we cannot get rid of the fly, but we can destroy or isolate and submit to treatment any Government camel found to be suffering from surra. We cannot, however, destroy, on account of expense, every privately owned surra camel. To prevent the spread of surra amongst the Government camels, our first object must be to get rid of the reservoirs of infection, and our second

object to keep camels isolated from privately owned camels during the fly season.

We can accomplish our first object by submitting the camels to daily examination. Although the blood of every camel cannot be examined daily, as explained under the heading Diagnosis, it is quite easy, and takes only a short time, to take the morning temperature daily of a large number of camels and examine the blood of any showing a morning temperature of 99° F. or over. Any diagnosed as affected should be at once destroyed or isolated and submitted to treatment. If this method is systematically carried out, in a short time every case of surra in the corps will be detected. We can accomplish our second object (*i.e.*, isolation of Government camels from the privately owned during the fly season) by setting apart rakhs free from *Tabanidæ* for Government camels. To sum up, the spread of surra can be prevented by (1) getting rid of the reservoir of infection; (2) grazing the camels in rakhs free from biting flies during the fly season, and in which private camels are not allowed to graze.

**The Examination of a Rakh for Biting Flies.**—To determine whether a rakh is free from *Tabanidæ*, we must search for:

1. The mature fly.
2. Egg masses.
3. Larvæ and pupæ.

1. *To Search for the Mature Fly.*—Three or four camels should be taken and kept close to a pond or any permanent water in the rakh. If in two or three days no *Tabanidæ* appear on the camels at the different ponds, it is safe to assume that no mature flies are about.

2. *To Search for Egg Masses.*—The blades of grass or rocks overhanging the water, as also the leaves of trees in the same situation, must be carefully examined for egg masses. If no egg masses are discovered, we have to search for the larvæ and pupæ.

3. *To Search for Larvæ and Pupæ.*—The mud round the ponds must be dug up to a depth of 2 or 3 inches by means of a knife. A start should be made on the mud at the edge of the water (for larvæ), working back from the wetter mud to the drier (for pupæ).

Only if all three are absent can we state that the rakh is free from *Tabanidæ*.

**Time to purchase Remounts.**—Before any remount for a camel corps is purchased the blood should be carefully examined; but, as has already been explained, the fact of the blood being free from trypanosomes on the day of examination does not necessarily indicate that the camel is not suffering from surra. The camel becomes infected with surra during the fly season; in the majority of cases the animals are not worked during this time and get good grazing; they therefore do not lose condition rapidly, so that at the beginning of the cold weather, though surra-infected, they may still be in good condition. On the other hand, towards the end of the cold weather the surra-infected camel, especially if it has been worked during the early part of the winter, will have lost a good deal of condition. It is therefore obvious that the time to buy remounts is at the end and not at the beginning of the cold weather, and no camel should be purchased that is not in good condition, special attention being paid to the thigh muscles, which should be well developed.

All remounts should be kept isolated for six weeks from the remainder of the corps camels.

If blood-sucking flies can be prevented from attacking camels, the spread of the disease could be prevented. Camels have been smeared or sprayed with the following preparations: Kerosine oil emulsion, taramira (*Eruca sativa*) oil emulsion, asafœtida solution, chirpine oil emulsion, creosol emulsion, Jensen's emulsion, citronella oil, aniseed oil, cod-liver oil, and castor oil, but none proved to be of any practical value in warding off the attacks of *Tabanidæ*.

## FILARIASIS

**History.**—*Filaria* were first demonstrated in the camel by Goubeaux in 1853, and in 1880 by Evans at Dera Ismail Khan. They have also been found in camels in South-East Africa, Algeria, and Western Australia. The adult worm is usually found in the spermatic, pulmonary, and mesenteric bloodvessels, and the filarial embryos in the peripheral circulation. They have been named, after Evans, *Filaria Evansi*. The embryos can be easily seen in wet-film preparations. The adult worm varies in length up to 9 inches, and the embryos from 200  $\mu$  to 250  $\mu$ .

**Distribution.**—Camels suffering from filariasis are found throughout the Punjab. As the result of his investigations, Leese came to the conclusion that the parasite in Northern India can only be acquired west of the Indus, and is far more commonly met with in camels which at some period in their lives have been living in or travelling in Trans-Indus territory.

**Symptoms.**—The presence of *filaria* does not appear to cause any harmful effects in the camel. Beyond periodical attacks of fever, they produce no symptoms unless they are very numerous, when a loss of condition probably occurs. Filarial embryos are not uncommonly found in camels in the pink of condition. If the filarial embryos are very numerous the condition of the camel is generally poor. Leese maintains that if the embryos are more than fifty in 5 c.c. of blood the condition is always poor.

With regard to the condition of camels suffering from filariasis, it has to be borne in mind that in a large majority of cases the camels are also found to be suffering from surra.

**Duration of the Disease.**—The camel may harbour the parasite for years, and it is unlikely that recovery takes place. Leese thinks that recovery may frequently take place, as he occasionally found dead adult parasites on post-mortem.

**Spread of the Disease.**—The means by which the disease is spread from one camel to another is not known. Leese concludes that the most likely explanation of the spread of filariasis is that the embryo is removed from the circulation of its host by some blood-sucking intermediary host in which it has to undergo some developmental process, and then by some means regains access to the camel.

Cleveland and Johnstone observed filariasis embryos in a camel one month old, which they regarded as a case of placental transmission. Major Lindsay Smith found the blood of ticks on a camel to be swarming with filarial embryos.

**Treatment.**—Up to the present no drug has been found to have any effect upon filaria.

**Post-Mortem.**—Post-mortems made on animals suffering from filariasis present no definite appearances beyond emaciation and the presence of the parasite.

## HÆMORRHAGIC SEPTICÆMIA

Camels are not susceptible to hæmorrhagic septicæmia. To determine the susceptibility of these animals to the disease, two camels were inoculated with 2 c.c. of H.S. culture, and two calves and two rabbits acted as controls.

*Camel No. 1.*—Male, one year old, inoculated with 2 c.c. of H.S. culture subcutaneously. Ten hours after inoculation the temperature rose to 104.8° F.; thirty-four hours after inoculation there was slight swelling, hot and painful. This gradually subsided, fæces remained normal, and the camel continued to feed well. Twenty-four hours after inoculation the temperature became normal, and continued so till the seventh day, after which no further observations were made, the camel being in a normal state of health.

*Camel No. 2.*—Male, seven years old, inoculated with 2 c.c. of H.S. culture subcutaneously. Thirty-four hours after inoculation showed a very slight rise in temperature; forty-eight hours after inoculation slight swelling on the seat of inoculation. This swelling disappeared after two



days. The camel fed well the whole time. He was kept under observation seven days.

*Control No. 1.*—Rabbit, inoculated with 0.5 c.c. of H.S. culture subcutaneously. Died in twenty-two hours.

*Control No. 2.*—Rabbit, inoculated with 0.5 c.c. of H.S. culture subcutaneously. Died in twenty-two hours.

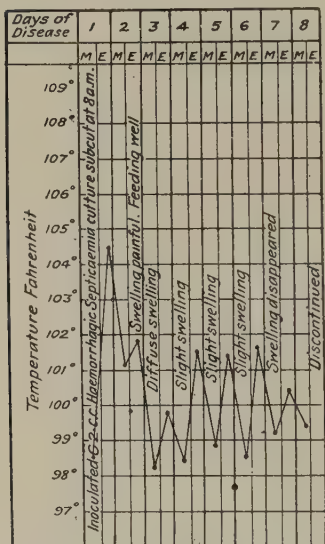


FIG. 37.—HÆMORRHAGIC SEPTICÆMIA.

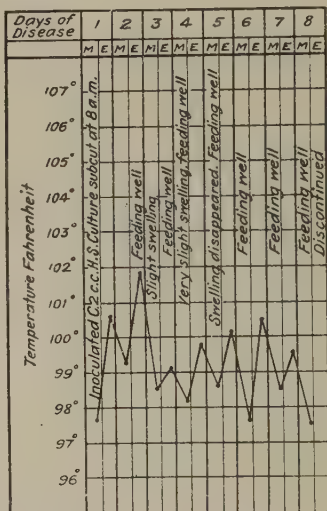


FIG. 38.—HÆMORRHAGIC SEPTICÆMIA.

Camel No. 1. Male, one year old. Camel No. 2. Male, seven years old.

*Control No. 3.*—Calf, inoculated with 2 c.c. of H.S. culture subcutaneously. Died in nineteen hours.

*Control No. 4.*—Calf, inoculated with 2 c.c. of H.S. culture subcutaneously. Died in twenty-eight hours.

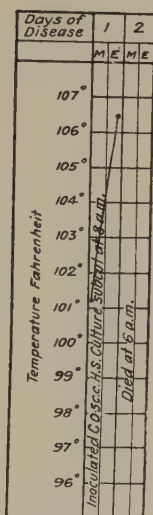


FIG. 39.—HÆMORRHAGIC SEPTICÆMIA.

Rabbit No. 1 (Control No. 1).

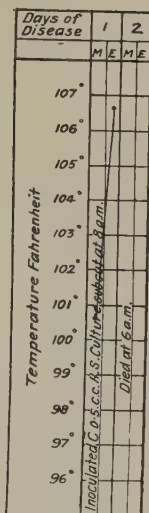


FIG. 40.—HÆMORRHAGIC SEPTICÆMIA.

Rabbit No. 2 (Control No. 2).

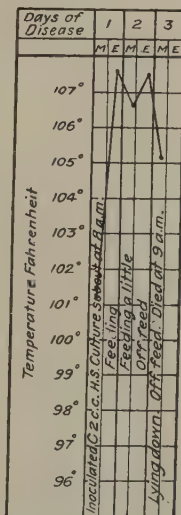


FIG. 41.—HÆMORRHAGIC SEPTICÆMIA.

Calf (Control No. 3).

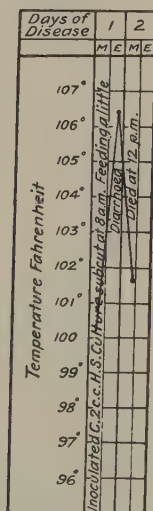


FIG. 42.—HÆMORRHAGIC SEPTICÆMIA.

Calf (Control No. 4).

## ANTHRAX

The characteristics of anthrax in the camel (or *sool*, as it is termed by the Punjabi camelman) are similar to those observed in cattle.

**Distribution.**—It occurs throughout the Punjab, and is probably much more common than is generally supposed.

**Etiology.**—The cause of anthrax is the *Bacillus anthracis*, an anaerobic, non-motile, spore-producing bacillus found in the blood, spleen, kidney, etc.

**Symptoms.**—The camel suddenly ceases to browse, and after a short time sits down; there is a rise of temperature, cessation of rumination, the head is stretched out on the ground, breathing is rapid, there are symptoms of pain as evidenced by rolling, the camel is unable to rise, and death takes place within a few hours after the animal is noticed to be sick.

**Diagnosis.**—In cases of sudden death anthrax should always be suspected, and an examination made of the blood for the bacillus. This is done by making a smear of blood from the ear and staining with methylene blue or carbol fuchsin, or by McFadyean's method. When opportunity admits, it is always advisable to make cultures, as the *B. anthracis* may be mistaken for the bacillus of malignant œdema or putrefactive bacteria.

Though in India sudden death amongst camels may occur from kaneir (oleander) poisoning and snake bite, it should be made a rule that in all cases of sudden death an examination of the blood ought to be carried out.

**Treatment.**—The malady runs such a rapid course that attempts at curative treatment are useless, but steps should be at once taken to prevent the spread of the disease. This entails—

1. Determining the source of infection.
2. Vaccine and serum inoculation.
3. Disposal of anthrax carcasses.
4. Segregation of in-contact animals.

1. *Source of Infection*.—The source of infection may be the water, fodder, or the camel chewing anthrax-infected bones when out grazing in the jungle. The camels should be watered from a different source, the fodder changed, and no camels allowed to graze in the area where cases have occurred.

2. *Vaccine and Serum Inoculation*.—So far no investigations have been carried out in connection with vaccines or sera for the protection of camels against the disease.

3. *Disposal of Anthrax Carcasses*.—No post-mortems should be made, but smears of blood from the ear should be taken and submitted to examination, the carcass and the gear of the camel should be burnt, and the place where death occurred thoroughly disinfected.

4. *Segregation of In-Contact Animals*.—All camels that have been in contact or grazing in that particular part of the grazing ground where cases of anthrax have occurred should be segregated from all other camels and kept under observation; any showing high temperatures should be kept apart, and not until ten days have elapsed since the last case has occurred should the camels be allowed in contact with other camels.

**Post-Mortem.**—The post-mortem lesions are similar to those seen in typical cases in cattle, the principal of which are discharge of blood from the natural orifices—dark-coloured blood which does not coagulate readily—enlargement of the spleen, inflammation of all the internal organs, and the presence of anthrax bacilli in the blood.

Steel, in his "Manual of Diseases of the Camel," states that anthrax is described by Nunn as destroying in Shapur district hundreds of camels annually, and by Oliphant as "a very serious malady in the camel, which caused immense loss in the space of a few weeks in the Kurram Force, spreading rapidly and running its course in a very short time." The latter officer states that at one station, out of 919 camels, 419 died in seventeen days (July 22 to August 7), and the camel column of the force was annihilated, 1,400 animals dying in July, August, and September.

Burke divides the disorder into internal and external forms; he finds that the latter often recover.

Nunn describes two forms of anthrax, dysenteric and apoplectic, as occurring in Montgomery. With regard to symptoms Steel says: "The disease is most frequent during and after the rains; it is protean in its manifestations, and not unfrequently has run its course unobserved, so that the patient seems to fall dead suddenly or after having been for an hour or so in distress. As a rule the first signs noticed are dark-coloured urine, the animal refusing food and drink, and becoming suddenly and rapidly emaciated. The internal temperature will be found high, rumination suspended, and the limbs apparently stiff and rigid. In the external form of anthrax the skin becomes infected with boils and eruptions of various kinds, which Burke has, by observation of bacilli in them, demonstrated as true features of the disease. Diarrhœa and hæmorrhagic evacuations, sometimes associated with protrusion of the rectum, occur in some cases, and a peculiar putrid and offensive smell of the animals before death, with rapid decomposition of the carcass after death (Nunn). The disease under this latter form has possibly been confounded with rinderpest."

With regard to the above, it is more than probable that in the 1,400 camels that died during July, August, and September, the cause of death was surra and not anthrax. With reference to the external form of anthrax mentioned by Burke, no such cases have been met with by the writer; but from the fact that Burke found the bacilli in the eruptions of the skin, it must be presumed that such a form exists.

### BLACK QUARTER

Though outbreaks of black quarter, such as occur among cattle, have not been reported amongst camels, deaths from this disease are said to be met with occasionally. Camels inoculated with black-quarter virus are as susceptible as cattle to the disease. The disease in camels runs a similar course to that in cattle.

**Etiology.**—The disease is due to the *Bacillus chauveii*. The bacillus is rod-shaped with rounded ends, anaerobic, motile, and gas-producing. It occurs generally singly, though occasionally in pairs; there is no capsule; it produces oval spores usually towards one end. The bacillus is easily stained with aniline colours, but does not stain readily by Gram's method, and may be regarded as Gram-negative. It is readily isolated from the infected tissues.



FIG. 43.—SWELLING OF HIND QUARTER IN BLACK QUARTER.

**Symptoms.**—In experimental cases the disease runs a very rapid course, death taking place in from thirty-seven and a half hours to sixty-three and a half hours. The younger the animal, the more rapidly does death occur. The charts on p. 106 show the course that the disease runs in one-year-old camels and in a seven-year camel. The first symptom is a rise in temperature, followed by suspension of rumination and loss of appetite. The camel is noticed to show a disinclination to stand, and when walked is seen to go



lame. After the first appearance of stiffness a swelling soon appears on the shoulder or hind quarter; the swelling is at first slight, but rapidly increases in size and becomes emphysematous. Breathing is now rapid and difficult and accompanied by grunts. After the swelling has become considerable, the camel lies on the side, is incapable of rising; the breathing becomes more difficult and may become rapid or very slow, the face has an agonized look, and the temperature falls rapidly before death takes place.

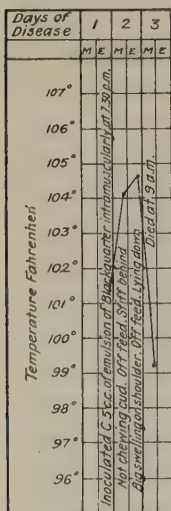


FIG. 44.—BLACK QUARTER.  
Camel No. 1,  
one year old.

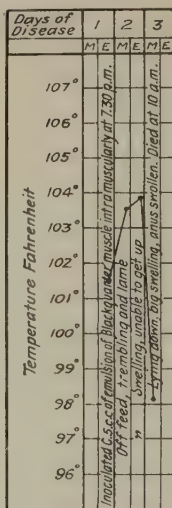


FIG. 45.—BLACK QUARTER.  
Camel No. 2,  
one year old.

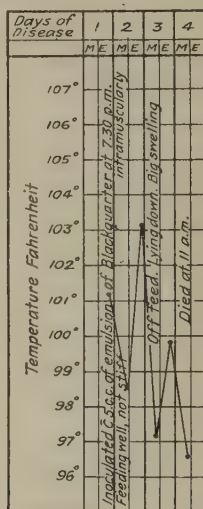


FIG. 46.—BLACK QUARTER.  
Camel No. 3,  
seven years old.

**Post-Mortem Lesions.**—The chief lesion is the emphysematous, crepitating swelling on the shoulder or hind quarter. When cut into, the muscles appear blackish in colour.

**Treatment.**—The disease runs such a rapid course that curative treatment is of no avail. Measures for the preven-

tion of the spread of the disease should be adopted. Such measures consist of—

1. Disposal of the carcass.
2. Segregation of the healthy from the in-contact.
3. Disinfection of the gear.
4. Vaccination.

*Disposal of the Carcass.*—The carcass should not be opened. It should be burnt or buried in lime, and the ground where death has occurred thoroughly disinfected.

*Segregation.*—All the in-contact camels should be segregated from other camels for ten days, and no camel allowed to graze for some time in the area where the case has occurred.

*Disinfection of the Gear.*—All the gear of the affected animal should be thoroughly disinfected. The padding of the saddle should be burnt, and the wooden parts and loading ropes, etc., put in strong solution of phenyl or other disinfectant.

*Vaccination.*—Up to the present no experiments with regard to protective vaccines have been carried out in camels.

## RHEUMATISM.

Camels suffer a great deal from rheumatism. It is termed by natives *aker*. Though articular rheumatism is very common, muscular rheumatism is very rare.

**Distribution.**—The disease is met with in all parts of the Punjab, but is more common in some districts than in others. Amongst camels working at Jullunder during the cold weather rheumatism is very common.

**Etiology.**—Though probably due to bacterial invasion, the causal organism has not yet been isolated. Improper feeding, cold, and damp, are certainly contributing causes. Camelmen state that if camels are fed on sheesham leaves for any length of time they develop rheumatism. Un-

doubtedly camels kept in districts where sheesham-trees abound do suffer a great deal from rheumatism, but where these trees thrive there is always a lot of water, and the cold, damp ground may probably have more to do with it than the eating of the leaves mentioned.

**Symptoms.**—The most prominent symptom is lameness, which varies in degree. When the camel suffering from rheumatism is made to get up and walk he suffers acute pain, and moves as if he was suffering from sore pads and frightened to put any weight on the feet. He will hobble along till he gets warmed up, when the symptoms gradually pass off, except in cases of long standing. The joints of the forelegs appear to be more often affected than those of the hind legs. Although in some cases the fetlock joints are slightly swollen and inflamed, this is not often met with, but a cracking sound of the joints when the camel walks is a common symptom. Beyond lameness and this cracking sound, the camel suffering from articular rheumatism presents few symptoms. He only loses condition gradually.

**Treatment.**—There is no radical cure. Change of diet, rest, and a dose of magnesium sulphate, followed by small doses of sodium bicarbonate, act beneficially. Small daily doses of magnesium sulphate and potassium nitrate also produce good results, but salicylates and potassium iodide do not appear to give any relief; probably the doses given have not been sufficiently large. Stimulating liniments to the joints produce no good result. Dry camping grounds should be chosen, and whenever possible green fodder should be given.

## TUBERCULOSIS

Deaths from tuberculosis are not frequently reported. The disease probably occurs more frequently amongst camels than is at present suspected.

**Etiology.**—The disease is caused by the *Bacillus tuberculosis*. The bacillus is short and rod-shaped, and when

stained gives a beaded appearance. It is easily isolated from the lesions. Whether it differs in cultural respects from the bacillus giving rise to tuberculosis in cattle has not yet been determined.

**Symptoms.**—A camel may be suffering from tuberculosis and yet present no marked symptoms; even in the last stages of the disease, where the animal becomes greatly emaciated, beyond emaciation and general debility no other symptoms may be observable.

A case of generalized tuberculosis presented the following symptoms: fever, poor appetite, coughing, blood in the urine, and great debility. Swelling and suppuration of superficial lymphatic glands are very common in the camel, but cannot be regarded as symptomatic of tuberculosis.

**Post-Mortem Lesions.**—The lesions in the case of generalized tuberculosis present similar characteristics to those met with in cattle.

**Tuberculin Test.**—No experiments with regard to tuberculin as a means of diagnosis of tuberculosis have so far been carried out.

## FOOT AND MOUTH DISEASE

Though foot and mouth disease is very prevalent amongst cattle in the Punjab, it does not appear to affect camels.

According to Friedberger and Fröhner, Theiler, Gray and Steel, camels are susceptible to the disease. Leese kept camels grazing in areas in which cattle were suffering from foot and mouth disease, but none of his camels developed the affection. He was unable to transmit the disease to them by inoculation.

## CHAPTER VII

### DISEASES OF THE RESPIRATORY SYSTEM

THE chief respiratory diseases from which the camel suffers are pneumonia and a disease termed by natives of the

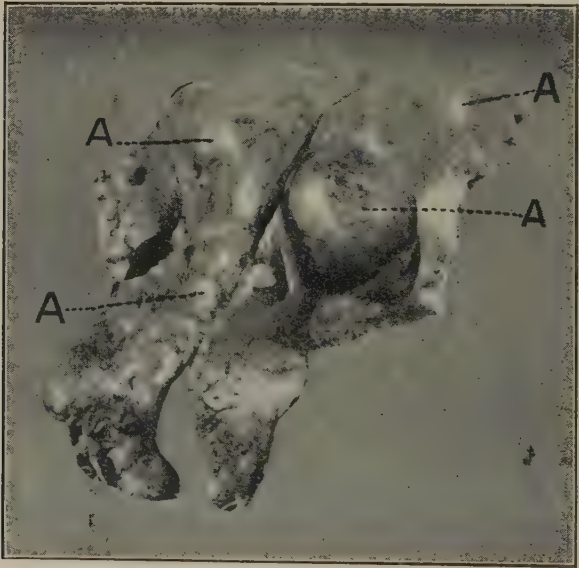


FIG. 47.—ECHINOCOCCUS CYSTS IN LUNGS (A).

Punjab *mora* or *zahmut*, which runs a course resembling influenza. Leese states that pleurisy from fractured rib is more common in camels than in other animals, and that

pleurisy in the camel is diagnosable by the symptoms associated with the disease in other animals. Camels are said to suffer from bronchitis and laryngitis, but sufficient evidence has not yet been obtained to enable a description of the course that bronchitis, laryngitis, and pleurisy run in the camel to be given. Though *Strongylus filariæ* have been found in the camel in the Punjab, no evidence is forthcoming that parasitic bronchitis is a common disease amongst camels in this country, though it is said to be frequently met with amongst camels in Egypt. Abscesses and hydatid cysts in the lungs are very common. On post-mortem large abscesses are often found in the lungs, yet the camel may have shown no symptoms whatever. Numerous echinococcus cysts may be found in the lungs without causing any symptoms.

## PNEUMONIA

A large number of camels in the Punjab are reported to die from pneumonia. It is often associated with surra. Camels do not appear to be affected with so-called contagious pneumonia. From the fact that camels may be suffering from large abscesses in the lungs and yet appear to be in normal health, it can be readily understood that to differentiate the various types of pneumonia is quite impossible. In dealing with diseases of the camel, the greatest difficulty in diagnosis is the fact that the animal, though he may be suffering from an acute disease, may present but very few symptoms.

**Etiology.**—Though pneumonia is said to be due to a specific organism, the predisposing cause is chill and cold. Pneumonic complications occur in rinderpest, tuberculosis, surra, influenza, etc.

**Symptoms.**—The chief symptoms are fever, cough, rapid breathing, irregular rumination, and loss of appetite. If hand-fed the loss of appetite is not so apparent, but if out browsing the camel will be observed to “hang about”



and not to feed readily. Usually there is constipation. Though the camel may be suffering from pneumonia, in many cases he is not noticed to be ill till he comes in from work, when one's attention is drawn to him by the fact that he is very dull and not eating his food readily. With the exception of dulness and being slightly off feed and perhaps a slight cough, no further symptoms may be presented ; if, however, the camel is kept working, the symptoms become aggravated and the disease is easily diagnosed.

**The Course of the Disease.**—Pneumonia runs the same course in the camel as in other animals, the stages being—

1. Congestion.
2. Red hepatization.
3. Grey hepatization.
4. Resolution.

**Treatment.**—The camel should be put off work immediately. He should not be tied down, but left loose, and allowed to graze if he shows any inclination to do so. If the nights are cold, he should be covered with a blanket. Green fodder, such as green wheat, green moth, green gram, green sarson, etc., if available, should be fed ; if no green fodder is procurable, branches of trees should be placed in front of him. When a camel refuses all other food, he will often pick off the leaves from branches of trees on which he has been accustomed to browse ; grain and gur (coarse sugar), if he has been accustomed to them, should be offered to him. Water should be allowed *ad lib*. The camel should not be worried by forcibly trying to induce him to eat ; camels, though they will often refuse to touch food when placed in front of them, will readily eat if small quantities are placed between the lips. With regard to medicinal treatment, at the commencement of the disease it is advisable to give a small dose of magnesium sulphate, followed by daily small doses of potassium nitrate in the drinking-water. If the camel has not been accustomed

to drink out of a bucket, the potassium nitrate should be given as a drench. In cases where the camel becomes very dull, stimulants, such as spiritus ætheris nitrosi, spiritus ammoniæ aromaticus, or ammonium carbonate, should be given. Ammoniated tincture of quinine in 1-ounce doses night and morning acts beneficially.

## MORA

Mora, or, as it is sometimes called, *zehmat*, is a form of contagious catarrh or influenza. It is commonly met with throughout the Punjab, usually in the cold weather. It spreads rapidly, and is the cause of considerable mortality.

**Etiology.**—No specific organism has been isolated. Predisposing causes are chills and cold.

**Symptoms.**—The camel is noticed to be dull and slightly off feed, with a watery discharge from the eyes and sometimes from the nostrils. As the disease progresses, loss of appetite is more marked, rumination becomes irregular or suspended altogether, with fever, accompanied by cough. Usually there is constipation, but sometimes there is diarrhœa; the camel loses condition rapidly, and becomes very weak.

**Duration.**—The disease runs a rapid course, resulting in recovery or death in ten days to a fortnight.

**Treatment.**—Unless the camels are carefully looked after, the mortality is often high. The animals should not be tied down, but should be allowed to browse during the daytime. At night they should be given grain and green fodder and covered with blankets. Good results are obtained by daily small doses of magnesium sulphate and potassium nitrate given as a drench. One-ounce doses of ammonium carbonate given in cold rice-gruel have also proved beneficial. Electuaries of belladonna, camphor, and potassium chlorate give satisfactory results, and the daily administration of hyposulphite of soda has a marked effect on the course of the disease.

In cases of great debility and loss of appetite stimulants must be given.

**Post-Mortem Appearances.**—No marked post-mortem lesions are observable, except in cases where the disease is complicated with pneumonia, when the usual lesions characteristic of pneumonia are found.

## BRONCHITIS

**Parasitic Bronchitis.**—Though this disease is stated to frequently occur in Egypt, it is seldom seen in the Punjab. In one case reported by Leese in which *Strongylus filaria* was found, beyond a fairly frequent cough, which lasted for about two weeks, the camel presented no other symptoms.

## PLEURISY

Though camels are said to suffer from pleurisy, further investigations are necessary before any description of the course that the disease runs in the camel can be given.

## CHAPTER VIII

### DISEASES OF THE ALIMENTARY SYSTEM

THE chief diseases affecting the alimentary system in the camel are constipation, diarrhœa, peritonitis, tympanites, gastritis, impaction of the rumen, and dysentery. Deaths from rupture of the rumen and diaphragm are reported, but in these cases it is probable that the camels were suffering from tympanites, and that the rupture of these organs was due to distension of the rumen with gas.

Tapeworms (*Tænia expansa*, *T. centripunctata*, and a *tænia* resembling *T. globipunctata* of the sheep) are found in the alimentary tract, but do not appear to cause any harmful effects. Leese attributes a form of peritonitis to *Linguatula tænioides* larvæ found in the glands of the cæcum and colon. Steel records a case of fatal diarrhœa as due to *Trichocephalus cameli*. *Schistosomum Indicum* is found in the mesenteric veins of camels, but produces no symptoms.

### INTERNAL PARASITES

1. *Schistosomum Indicum* (in the mesenteric veins of the large intestine).
2. *Linguatula tænioides* (in the glands of cæcum and colon).
3. *Filaria Evansi* (in the spermatic and pulmonary blood-vessels).
4. Filarial embryos (in the peripheral circulation).
5. *Thelazia Leesei* (beneath the eyelids).
6. *Æstrus cameli* (in a cavity above the base of the tongue).

7. *Tænia centripunctata* (in small intestine).
8. *Tænia expansa* (in the duodenum).
9. *Tænia* resembling the *T. globipunctata* of the sheep (in the duodenum).
10. *Strongylus filaria* (in the bronchial tubes).
11. *Distoma hepaticum* (in bile-ducts).
12. *Distoma lanceolatum* (in bile-ducts).
13. *Trypanosoma Evansi* (in peripheral circulation).
14. Leeches, *Hæmopsis sanguisuga* (under the tongue).
15. Hydatid cysts, *Echinococcus veterinorum* (lungs and liver).
16. *Cænurus cerebralis* (in cerebellum).
17. *Trichocephalus cameli* (in intestine).

## CONSTIPATION

Constipation is very frequently met with in camels. The normal fæces of these animals consist of small oval balls somewhat soft in consistency. In constipation these balls become more oblong, with twisted ends. In normal health the camel defæcates many times in the day. If the quantity of fæces passed is less than normal, or the fæces are more oblong, small with twisted ends, or harder in consistency than normal, a purgative should be at once administered. The best purgative for camels is Epsom salt in doses of 1 to 2 pounds, depending upon the size of the animal. The following experiments show the action of purgatives in the camel.

*Kamala*.—Camel No. 1:—1 pound of kamala in linseed tea given as a drench:

14	hours	after	drench	given,	diarrhœa,	feeding	well.
17½	"	"	"	"	vomiting,	off	feed.
40	"	"	"	"	diarrhœa,	very	watery and frequent,
					off	feed.	
64	"	"	"	"	fæces	like	cow-dung, feeding a little.
88	"	"	"	"	fæces	like	normal pellets, feeding well.

# DISEASES OF THE ALIMENTARY SYSTEM 117

Camel No. 2 :—8 ounces of kamala in linseed tea given as a drench :

13½	hours	after	drench	given,	fæces	like	cow-dung,	feeding	well.
14½	"	"	"	"	watery	diarrhœa,	not	very	frequent,
					feeding	well.			
25	"	"	"	"	fæces	like	cow-dung,	feeding	well.
38	"	"	"	"	fæces	like	cow-dung,	feeding	well.
42	"	"	"	"	fæces	soft	pellets,	feeding	well.
62	"	"	"	"	fæces	normal	pellets,	feeding	well.

Camel No. 3 :—4 ounces of kamala in linseed tea given as a drench :

13½	hours	after	drench	given,	fæces	normal,	fed	well.
27½	"	"	"	"	"	"	"	"
61½	"	"	"	"	"	"	"	"

Result : The dose of kamala to be given to a camel to produce purgation is 8 ounces. With this dose the camel is not nauseated.

*Linseed Oil.*—Camel No. 4 :—4 pints given as a drench :

13½	hours	after	drench	given,	diarrhœa,	off	feed.
28	"	"	"	"	diarrhœa,	very	watery and frequent,
						off	feed.
52	"	"	"	"	diarrhœa,	very	watery and frequent,
						feeding	a little.
76	"	"	"	"	fæces	like	cow-dung, feeding a little.
100	"	"	"	"	fæces	very	soft pellets, feeding
						fairly.	
124	"	"	"	"	fæces	normal	pellets, feeding well.

Camel No. 5 :—3 pints given as a drench :

13½	hours	after	drench	given,	fæces	normal,	fed	well.
28	"	"	"	"	"	"	"	"
52	"	"	"	"	"	"	"	"
76	"	"	"	"	"	"	"	"

Camel No. 6 :—2 pints given as a drench :

13½	hours	after	drench	given,	fæces	normal,	fed	well.
37½	"	"	"	"	"	"	"	"
61½	"	"	"	"	"	"	"	"

Result : 4 pints must be given to produce purgation.





Camel No. 12:—3 ounces of aloes dissolved in water given as a drench :

13½	hours after drench given,	fæces normal, fed well
27	" " " "	fæces soft pellets, fed well.
37½	" " " "	diarrhœa, but not watery, fed well.
61½	" " " "	fæces normal pellets, fed well.

Camel No. 13:—3½ ounces of aloes dissolved in water given as a drench :

17	hours after drench given,	fæces normal, fed well.
19½	" " " "	diarrhœa, watery and frequent, fed fairly.
48	" " " "	diarrhœa, watery, fed well.
50	" " " "	fæces like cow-dung, fed well.
72	" " " "	" " " "
94	" " " "	fæces normal pellets, fed well.

Camel No. 14:—4 ounces of aloes dissolved in water given as a drench :

17	hours after drench given,	fæces normal, fed well.
41	" " " "	diarrhœa, very watery and frequent, fed well.
65	" " " "	diarrhœa, watery, fed fairly.
89	" " " "	fæces like cow-dung, fed well.
113	" " " "	fæces soft pellets, fed well.
137	" " " "	fæces normal pellets, fed well.

Camel No. 15:—6 ounces of aloes dissolved in water given as a drench :

17	hours after drench given,	fæces normal, fed well.
32	" " " "	diarrhœa, very watery and frequent, off feed.
41	" " " "	diarrhœa, watery and frequent, fed fairly.
65	" " " "	fæces like cow-dung, fed well.
89	" " " "	" " " "
113	" " " "	fæces normal pellets, fed well.

Result : To produce purgation, 3½ ounces dissolved in water should be given.

*Magnesium Sulphate (Epsom Salt).*—Camel No. 16:—2 pounds of magnesium sulphate dissolved in water and given as a drench :

14	hours after drench given,	diarrhœa, not very watery nor very frequent, fed fairly.
38	" " " "	fæces like cow-dung, fed well.
62	" " " "	fæces normal pellets, fed well.

Camel No. 17:— $1\frac{1}{2}$  pounds of magnesium sulphate dissolved in water and given as a drench :

14 hours after drench given,	fæces like cow-dung, fed well.
17 " " "	slight diarrhœa, fed well.
41 " " "	fæces normal pellets, fed well.

Camel No. 18:—1 pound of magnesium sulphate dissolved in water and given as a drench :

14 hours after drench given,	fæces normal pellets, fed well.
27 " " "	fæces like cow-dung, fed well.
38 " " "	fæces soft pellets, fed well.
62 " " "	fæces normal pellets, fed well.

Result : The dose to produce purgation is  $1\frac{1}{2}$  to 2 pounds.

*Gamboge*.—Camel No. 19,  $2\frac{1}{2}$  ounces of powdered gamboge in water given as a drench :

22 hours after drench given,	fæces like cow-dung, fed well.
50 " " "	fæces soft pellets, fed well.
70 " " "	fæces normal pellets, fed well.

Camel No. 20:—3 ounces of powdered gamboge in water given as a drench :

$13\frac{1}{2}$ hours after drench given,	fæces normal, fed well.
19 " " "	fæces like cow-dung, fed well.
$37\frac{1}{2}$ " " "	watery diarrhœa, fed well.
$49\frac{1}{2}$ " " "	fæces soft pellets, fed well.
$61\frac{1}{2}$ " " "	fæces normal pellets, fed well.

Result : To produce purgation, 3 ounces should be given.

*Eserine and Pilocarpine*.—Camel No. 21:—2 grains of eserine and 2 grains of pilocarpine dissolved in 80 minims of water injected subcutaneously :

13 minutes after injection,	passed normal fæces.
35 " " "	salivation occurred.
1 hour 25 minutes after injection,	passed soft pellets.
1 " 31 " " "	passed fæces like cow-dung.
1 " 34 " " "	severe straining.
1 " 54 " " "	diarrhœa.
2 hours 19 " " "	watery diarrhœa.
5 " after injection,	fed fairly and drank water, salivation, straining ceased, but diarrhœa still continued.
8 " " "	fed gram and bhusa.

The injection was made at 10 a.m., and the following morning at 7 a.m. the fæces were normal pellets and the camel fed well. In 3 hours and 19 minutes 29 pounds of fæces were passed (the watery diarrhœa was not collected).

Camel No. 22:—4 grains of eserine and 4 grains of pilocarpine in 200 minims of water injected subcutaneously:

15 minutes after injection, camel very uneasy, urinated in small quantities.				
16	"	"	"	shivering, straining, and salivation.
18	"	"	"	passed normal fæces.
20	"	"	"	tears from eyes, perspiration, and rapid breathing.
21	"	"	"	very uneasy, great difficulty in sitting down.
24	"	"	"	lay down, very rapid breathing and much salivation.
30	"	"	"	passed soft pellets.
51	"	"	"	passed a large quantity of urine.
1 hour 47 minutes after injection, passed fæces like cow-dung.				
2 hours after injection, diarrhœa.				
4½	"	"	"	very watery diarrhœa.
5	"	"	"	straining and salivation had ceased, but the camel was very weak; when attempts were made to get him to walk, he fell down,
8	"	"	"	was off feed; water was given as a drench.
20	"	"	"	fed well.

The injection was made at 11 a.m., and at 7 a.m. the following morning the camel passed fæces like cow-dung, and 12 p.m. the same day passed normal fæces. In 2½ hours passed 31 pounds of fæces (the watery diarrhœa was not collected).

**Summary.**—To produce purgation in the camel the following doses require to be given:

- 3 ounces kamala.
- 4 pints linseed oil.
- 3½ drachms of croton oil.
- 3½ ounces of aloes in solution.
- 1½ to 2 pounds magnesium sulphate.
- 3 ounces gamboge.
- 2 grains of eserine and 2 grains of pilocarpine given subcutaneously.

Of these, the best purgative for the camel is magnesium sulphate; the others come in the order named—kassia, croton oil, aloes, gamboge, linseed oil. Eserine and pilocarpine give very satisfactory results in doses of 2 grains eserine and 2 grains pilocarpine subcutaneously.

## DIARRHŒA

Diarrhœa is frequently seen in camels. It may result from the animals browsing off certain trees (such as jali), or it may follow the administration of irritant drugs or too large a purgative dose. It is met with in kassia (oleander) and arsenical poisoning, and in camels suffering from rinderpest, and in the last stages of surra, also in debility and in dysentery. Steel records a case of fatal diarrhœa due to *Trichocephalus axillii*.

**Treatment.**—Treatment depends upon the cause. If depending on too large a dose of purgative medicine, chlorodyne or tincture of opium should be administered, followed by demulcents, linseed tea, eggs, milk, and rice-gruel. If there is considerable prostration, stimulants must be given. If due to irritant drugs, these must be got rid of by the administration of laxatives, combined with chlorodyne or tincture of opium and followed by demulcents. When diarrhœa is simply a symptom of some other disease, the treatment necessary for that particular affection must be adopted.

## INDIGESTION

Indigestion is not uncommon amongst camels, and is usually met with in animals belonging to the poorer camel-owners.

**Etiology.**—It is due to improper feeding and debility.

**Symptoms.**—The camel is dull; the action of the bowels and rumination are irregular; the animal is frequently noticed to eat earth, and he often discharges a watery secretion from the mouth.

**Treatment.**—The camel should be given a change of diet, and 1 ounce of common salt allowed daily. Small daily doses of magnesium sulphate and sodium bicarbonate for a week, followed by ammonium carbonate and nuxvomica, act beneficially.

## TYMPANITES

Tympanites is commonly met with in camels, and is the cause of many deaths.

**Etiology.**—Tympanites results from the fermentation of the contents of the stomach, which may take place as the result of the ingestion of large quantities of green food. It may also occur from dry food in debilitated camels. It frequently occurs when debilitated camels are brought in from grazing grounds and fed with missa bhusa (pea straw) and grain; also when animals are fed liberally after being without food, on a long march, for a considerable time. It is also very frequently met with when camels are fed with large quantities of grain, when straw is not available, and the animals are watered shortly afterwards.

**Symptoms.**—The chief symptom is the distension of the rumen, which is accompanied by rapid breathing, loss of appetite, suspension of rumination, and restlessness. In some cases death takes place very rapidly, in others the camel lingers on for a considerable time.

**Treatment.**—Good results are obtained by the administration of one of the following drenches :

1. Turpentine 3 to 4 ounces.  
Carbolic acid 2 to 3 drachms.  
Linseed oil  $1\frac{1}{2}$  to 2 pints.
2. Aromatic spirits of ammonia 5 ounces in  
5 to 6 pints of water.

The camel should not be kept tied in the sitting position, but should be walked about till the flatulence has passed away. One to two hours after the administration of one or



other of the above drenches, 1 to 2 pounds of magnesium sulphate should be given.

No information is available regarding results obtained by puncture of the rumen in cases of tympanites in the camel.

**Post-Mortem.**—The rumen is found to be distended with gas and the lungs engorged with blood. Occasionally there may be rupture of the diaphragm, but it is doubtful if rupture of the stomach takes place very often.

## IMPACTION OF THE RUMEN

Many cases of deaths amongst camels are reported as due to colic or, as it is named by Punjabi camelmen, *sool*. The term *colic* or *sool* is, however, applied to any disease in which the camel shows signs of pain, and in all probability the affection from which the animal is suffering when he is stated to be attacked by colic is either tympanites or impaction of the rumen.

**Etiology.**—Impaction is produced by an abnormal quantity of food in the rumen, insufficient water, and debility.

**Symptoms.**—The symptoms vary greatly. In some cases, beyond loss of appetite, suspension of rumination, and constipation, no other symptoms are observable. The animal may appear to be in perfect health, and did we not know that the camel was off feed and constipated, he may present no symptoms to lead us to think that there is anything wrong. On the other hand, he may show signs of pain; the head is stretched out on the ground, there is grinding of the teeth, the abdomen is distended, a small quantity of oblong balls with twisted ends may be passed, the breathing is rapid, and there is complete loss of appetite and suspension of rumination.

**Treatment.**—Magnesium sulphate in 2-pound to 3-pound doses in 8 pints of water should be administered. After the lapse of two hours 4 ounces of ammonium carbonate and  $\frac{1}{2}$  ounce of nux vomica should be given in cold linseed tea. Water should be allowed *ad lib*.

## GASTRITIS

Inflammation of the fourth stomach is, as far as is at present known, seldom met with in the camel, except as the result of poisoning with arsenic or other irritant drugs and in poisoning from kaneir (oleander). In cases of gastritis produced by arsenical and oleander poisoning the symptoms vary greatly. Sometimes, beyond loss of appetite, the camel exhibits no symptoms; in other cases, in addition to loss of appetite, there is vomiting, grinding of the teeth, inability to rise, and diarrhœa. On post-mortem acute inflammation of the fourth stomach is found.

**Treatment.**—Treatment consists in adopting measures to get rid of the poisonous drug or plant, and the administration of demulcents and sedatives. Two pints of linseed oil and 4 ounces of chlorodyne should be given, followed by linseed tea, milk, and eggs. Water *ad lib.* should be allowed, and if the camel can be enticed to eat, green fodder—*e.g.*, green wheat or green moth, or green gram or sarson—should be given.

## DYSENTERY

Dysentery is comparatively common amongst camels, and several deaths are reported from this disease.

**Etiology.**—The cause is not definitely known, but the affection is probably due to overwork in hot weather, bad food, general debility, and irritant drugs. Dysentery also occurs in camels suffering from rinderpest and surra.

**Symptoms.**—The symptoms vary greatly in degree, from simply slight loss of appetite and fæces mixed with blood and mucus to complete loss of appetite and of rumination, great prostration, watery discharge from the eyes, pain, foetid watery diarrhœa, and the passing of blood and mucus.

**Treatment.**—Small doses of Epsom salt repeated every three hours and accompanied by small amounts of chlorodyne or tincture of opium should be administered,

followed by demulcents such as rice-gruel, linseed tea, milk, and eggs. If the prostration is very great, stimulants must be administered. If the camel can be enticed to eat, green fodder should be allowed. Whether the administration of antiseptics in the treatment of dysentery in the camel would prove successful requires investigation.

**Post-Mortem Appearances.**—In cases of death from dysentery, the chief lesions are inflammation of the intestines and desquamation of the mucous covering. The carcass gives off a putrid odour.

## ENTERITIS

Though camels are stated to suffer from enteritis, it is probable that it only occurs as a sequel to other diseases, though it may be produced by the administration of irritant drugs. In post-mortems on camels that have died from dysentery, inflammation of the intestines is usually seen, and in those suffering from rinderpest inflammation of the intestines undoubtedly occurs. It is generally met with in animals that have died from arsenical poisoning, but it is doubtful whether it is a disease from which camels often suffer.

## PERITONITIS

Peritonitis, except when due to poisoning by arsenic and other drugs, does not appear to be commonly met in camels. Gibson records a case of peritonitis accompanied by traumatic pericarditis. The camel died quite suddenly, without apparently exhibiting any symptoms of sickness. On post-mortem a considerable quantity of claret-coloured serous fluid was found in the left flank, and on a lineal incision being made in the median line a similar fluid was revealed in the abdominal cavity, in which floated a good deal of lymph flakes, part of which adhered to the visceral peritoneum of the rumen, etc. This region of the digestive tract was of a dark red colour and showed signs of acute

inflammation. A dark red area of congealed material was noticed near the œsophageal entrance to the rumen, and traced through the diaphragm to the pericardium, which contained about 1 pint of claret-coloured fluid of the same nature as the peritoneal effusion. A wire nail perforating the right auricle was found.

In cases of peritonitis caused by arsenical poisoning there is also inflammation of the fourth stomach and kidneys. In these cases there is loss of appetite and suspension of rumination, vomiting, grinding of the teeth, and loss of control of the hind legs, if the animal is made to walk; very often it is impossible to make the camel get up; sometimes there is constipation and sometimes diarrhœa, and very often symptoms of pain. Medicinal treatment in such cases is of no avail.

### SPECIFIC PERITONITIS

Leese describes a form of peritonitis, which he terms "specific peritonitis," as follows:

**Occurrence.**—The disease appeared in the rainy season. All the affected camels were grazing on the bar lying between the old banks of the Beas and Ravi Rivers, and between Montgomery and Chichawanti. No other animal besides the camel is known to have been infected. Between ten and twenty cases occurred within a month in the 56th Silladar Camel Corps. Private camels were also known to have died of this disease; affected camels were more often than not in good condition.

**Symptoms.**—The first symptom observed is that the animal grazes or ruminates in a capricious manner; colicky pains and constipation are present, the fæces being passed in small quantity only, sometimes blood-stained, and as a rule covered with brownish mucus; slight fever is present. In a day or two there is marked depression, the colicky pains increase and become continuous, and the temperature rises. From this stage onwards defæcation ceases, but

the passing of a small quantity of bad-smelling mucoid discharge of the colour and consistency of either vaseline or treacle is an almost constant symptom.

The abdominal pain is shown by the sitting animal constantly shifting from one side to the other, and lying with the belly on the ground and the hind feet tucked to one side. In acute pain the animal is constantly raising and lowering the neck, and the eyes become prominent; when pain is less acute, the neck is stiffly erect and the ears are pricked backward, respirations are frequent and shallow, and the pulse is quick and hard; the animal sighs constantly, grunts occasionally, especially when the belly is pressed upon with the fist, and sometimes tears run down the face. When made to rise, he does so slowly and carefully. The belly is now swollen and rather tympanitic, but the tympanites is intestinal and not of the rumen; abdominal rumbling is often heard.

Sometimes at this stage the camel appears to take a turn for the better, returning to his grazing and chewing the cud a little, but this apparent improvement only lasts a few hours. The temperature from day to day runs from 99° F. to 102·5° F. in the morning and from 102° F. to 105° F. or more in the evening. During the last few days the camel is in a pitiful state and in continual acute pain; there is a dribbling of saliva from the drooping lower lip, the eyes are sunken, he sways in his gait, there is discharge from eyes and nose, high-coloured urine, and the pulse is imperceptible. The end is often preceded by a short period of great agony with tenesmus, and death occurs in about ten to twelve days from the first onset of symptoms.

The absence of diarrhoea, cutaneous swellings, and petechiæ on mucous membranes, was especially noted. In a minority of cases a soft suppressed cough was present, and on one day a discharge of blood from one or both nostrils was seen.

**Post-Mortem Appearances.**—The peritoneal cavity is found full of watery fæces when rupture of the bowel has

taken place. There is diffuse peritonitis, which has evidently lasted some time, as in some parts the peritoneum is entirely destroyed. The same peritonitis is found in cases where the intestine has not ruptured. A tumefied mass the size of a football represents the colic spiral. On examination the new tissue is found to be between the coils of the gut, or, in other words, the coils of the colon run through the mass; in some places it is firm, in others gelatinous in consistency. Dry, yellowish areas of necrosis are found in it here and there, up to the size of a walnut. Near the centre of the spiral the intestine is found to be compressed by contraction of the new tissue, forming a complete strangulation. Posterior to this, the intestinal mucous membrane is perfectly healthy-looking, even though the coils are completely enveloped in the new tissue, but no fæces are present in the part. Anterior to the strangulation the colon, which is sometimes ruptured completely a few inches away, is black and quite rotten and tears with the least pull; the gangrene is confined to the Peyer's glands, though sometimes it extends as far anteriorly as to involve the ileum. The duodenum and jejunum are not inflamed.

The constant feature in fatal cases is the mass of chronic inflammatory tissue in connection with the colon mass, and its results—strangulation of the colon and inflammation and gangrene of the gut anterior to it. Death sometimes occurs without actual rupture.

**Treatment.** — Treatment cannot be of avail when stricture has occurred. Rational measures appear to be segregation, burning dung and abdominal organs of camels dead of the disease, and disinfection of clinical thermometers used on the sick. Early in the disease liq. acid. carbolic. (B.P.) 2 drachms twice a day may be of use.

Leese further remarks that "the first severe lesion is not enteritis, but peritonitis"; this conclusion is justified by clinical observation and by the post-mortem appearances. The distribution of the enteritis shows it to be entirely due



to the complete stricture of the colon, which in turn is caused by the productive peritonitis. The disease is not due to a foreign body, lipoma, or volvulus, nor to irritant poisoning, since the stomachs and first part of the intestine are generally healthy.

Negative results were obtained by inoculation of the defibrinated blood of sick camels into the pigeon, camel, ox, guinea-pig, and rat.

He suggests that *Linguatula tænioides* larvæ, which he found in the glands of the cæcum and colon of camels that had died of the disease, may be the cause of the affection.

## CHAPTER IX

### DISEASES OF THE HEART, KIDNEY, AND LIVER

#### TRAUMATIC PERICARDITIS

GIBSON records a case of traumatic pericarditis accompanied by enteritis in the camel. The camel died suddenly without exhibiting any symptoms. On post-mortem a wire nail was found perforating the right auricle.

#### ŒDEMA

Occasionally œdema of the feet and œdema of the abdomen is met with. It is caused by debility, and occasionally is seen in camels suffering from surra. When not due to surra, a dose of Epsom salt followed by daily doses of 2 drachms of powdered digitalis for three or four days usually gives satisfactory results.

#### URINARY DISEASES

Nothing is known about the urinary diseases of the camel. Deaths are reported as due to inability to pass urine, and to nephritis.

Blood in the urine is occasionally seen ; in one case it was due to tuberculosis of the kidney.

Red-water fever has so far not been observed in the camel.

## DISEASES OF THE LIVER

Nothing is known regarding hepatic diseases in camels. On post-mortem hydatid cysts are frequently met with ; but though many cysts may be seen in the liver, they do not appear to produce harmful effects, neither do they produce any symptoms.

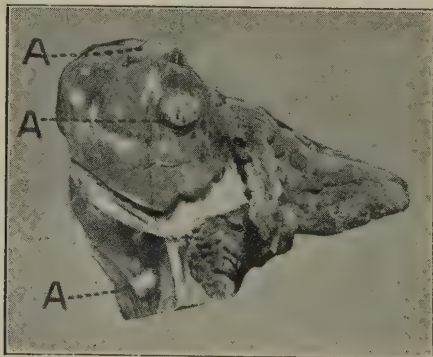


FIG. 48.—ECHINOCOCCUS CYSTS (A) IN LIVER.

*Distoma hepaticum* and *D. lanceolatum* are occasionally found in small numbers in the liver ; but cirrhosis of the liver (liver rot), such as occurs in sheep and cattle, is not found in camels in the Punjab. Leese found a fine cirrhosis of the liver on post-mortem in camels suffering from wail.

## CHAPTER X

### DISEASES OF THE NERVOUS SYSTEM

#### NERVOUS DISEASES

PRACTICALLY nothing is known regarding the diseases affecting the nervous system in the camel.

Diseases affecting the nervous system are :

1. Wail.
2. Kumree.
3. Meningitis.
4. Rabies.

Besides these, the camel is said to suffer from epilepsy, and to be suddenly affected with paralysis ; but no accurate information is available regarding these affections, and in all probability they are only symptoms of other diseases—*e.g.*, anthrax, surra. Von Linstow is quoted by Steel as having observed *Cænurus cerebrealis* in the cerebellum of the camel, but no description of the symptoms produced is given. Deaths from tetanus are also reported, but no reliable information regarding the disease in the camel is available.

#### Wail.

The term *wail* is applied by the natives of the Punjab to a disease the most prominent symptom of which is loss of control over the hind legs.

**Distribution.**—This disease is met with in areas where the grazing consists of practically nothing else but lana, and is most commonly seen amongst females.

**Etiology.**—The cause of the disease has not been determined. It is probably due to grazing continually on lana. It is much more frequent amongst the females than the males. The females are not taken to other districts for work, whereas the males are taken to different districts, and thus get a change of diet during part of the year.

**Symptoms.**—The most prominent symptom is loss of control of the hind legs, with consequent difficulty in getting up and sitting down. When walking, the hind quarters sway from side to side, and there is quivering and trembling of the thigh muscles. The temperature, pulse, breathing, and fæces show nothing abnormal. In the later stages the neck is carried more upright, and they are incapable of eating off the ground or browsing on small shrubs. The camel loses condition gradually; when hand-fed, he eats well to within a few days of death. If not hand-fed and he has to depend on browsing, he gets very emaciated, being too weak to walk about to get sufficient browsing. Cases of wail do not occur amongst young camels. No organism has been isolated from the blood. Injection of the blood into horses, camels, sheep, buffaloes, dogs, rabbits, and guinea-pigs, produced no ill effects.

**Treatment.**—Camels suffering from wail should be immediately removed from lana grazing grounds and given change of browsing. If the disease is of long standing, change of diet does not effect a cure. Medicinal treatment is of no avail.

**Post-Mortem Appearances.**—Beyond emaciation, no post-mortem lesions are observable.

### Kumree.

Kumree is the term applied by Punjabi camelmen to a disease in which the camel is unable to assume the sitting

position without great difficulty. It is characterized by trembling and quivering of the muscles of the hind quarters when the camel is assuming the sitting position. The disease varies greatly in degree, from slight trembling of the muscles to severe trembling. In some cases the camel can only sit down with the greatest difficulty, and in one case met with the camel was quite unable to sit down in the normal way, but used to throw himself down on one side. While standing or walking or after having assumed the sitting position, the camel presents no symptoms whatever; it is only during the act of sitting that the quivering and trembling of the muscles is seen. A camel once showing symptoms of kumree never recovers, but gradually gets worse and worse. Up to the present no treatment has given any satisfactory results.

### Meningitis.

Meningitis is the cause of considerable mortality amongst camels.

**Etiology.**—The cause of the disease is unknown.

**Symptoms.**—A camel suffering from meningitis presents the following symptoms: He appears quite normal, when suddenly, if sitting, he gets up, foams at the mouth, and bolts, and after going a certain distance falls down. After remaining down a short time, he gets up and starts running, and again after a short distance falls down. After a number of convulsive attacks he becomes comatose, and as a rule dies from coma and exhaustion.

**Treatment.**—If the case is seen in the early stages, the camel should be bled from the jugular—3 to 4 litres—and a large dose of magnesium sulphate administered. Cold water should be applied to the head, and large doses of chloral hydrate given till a sedative effect is produced. If the case is not seen till there is great prostration and exhaustion, stimulants should be resorted to, but in these cases death usually occurs.



**Rabies.**

The disease is rare amongst camels, but occasionally they become infected with rabies through bites from mad dogs. Leese describes a case occurring in a camel under one year old. This animal presented the following symptoms: paralysis of the tongue, partial paralysis of hind quarters, unnatural aggressiveness, and tenesmus. Camels suffering from rabies should be destroyed and the carcass burnt or buried.

## CHAPTER XI

### ANÆSTHESIA—CASTRATION—POISONING

#### ANÆSTHESIA

THE best anæsthetic for the camel is chloroform. The camel should be tied as described for castration and thrown on the side. Vaseline should be smeared around the nostrils. Half an ounce of chloroform is put on a large pad of tow, which is then applied to the nostril and covered with a towel, over which is placed a tarpaulin. Plenty of air must be allowed; this is accomplished by keeping one hand on the pad of tow and keeping the towel and tarpaulin raised. A further quantity of chloroform is slowly poured on the tow until the camel is anæsthetized.

The quantity of chloroform necessary to anæsthetize a camel is about  $1\frac{1}{2}$  ounces. If the animal has a tendency to bite, a rope, which can be easily undone, should be tied round the upper and lower jaws just above the nostrils; this should be removed immediately the camel is under the influence of the drug. After completion, whatever operation is to be performed, the camel should not be allowed to get up, but should be kept in the sitting position till he has completely regained his senses. If allowed to get up while still somewhat under the effects of the chloroform, he is liable to fall and damage himself.

## CASTRATION

During the "must" season camels give a good deal of trouble; not only do they fight amongst themselves, inflicting severe wounds, but they are a source of danger to their attendants, who not only often get severely bitten, but frequently are killed. In India castration of camels is not practised, the Punjabi camelmen thinking that the camel gelding is incapable of performing the same amount of work as the ungelded animal. In Algeria the natives castrate their camels at various ages, the age varying from two to seven years. Their methods vary, but all are very crude. By some tribes an incision is made in the scrotum, and the cord is stretched by pulling and then cut with the knife, hæmorrhage being controlled by the application of sulphur and the hot iron, and the scrotum is filled with a mixture of sand and camel-dung which has been heated over a fire; no more attention is paid to the camel, and it is said that deaths seldom occur. Amongst other tribes in Algeria, part of the scrotum is removed as well as the testicles, hæmorrhage being controlled by the application of sulphur and the hot iron. In Western Australia castration is practised.

The best method is by the hot iron. The operation may be done under chloroform. The camel must be securely tied. The forelegs are brought close together by passing a rope below the fetlock joints, the ends of the rope being then passed under the forearms and then over the neck, drawn tight and fastened. The hind legs are drawn close together by passing a rope round the pasterns and then passing the ends over the back, and after drawing tight are fastened over the back. The camel should then be pushed over on the side, and another rope attached just above the fetlocks and held taut by two or three men. Two men should be at the head and two at the hind quarters. The camel may now be chloroformed and the scrotum washed with a weak solution of phenyl or other antiseptic. An incision is made in the

scrotum and through the coverings of the testicles. The cord should be slightly pulled, the clams fixed, and the cord cut through with the hot iron. The ropes are then undone and the camel allowed to assume the sitting position. The wound of the scrotum may then be washed with antiseptics. The camel should be kept tied in the sitting position till the following day, when he may be allowed out to graze. A little boro-iodoform should be daily dusted over the wound till it has healed. The operation should not be done when flies are prevalent. If circumstances arise which necessitate the performance of the operation when flies are numerous, care must be taken that the wound does not become fly-blown; this is best prevented by the application of a bandage smeared with castor oil, and kept in position by tapes which are fastened over the back.

Cases arise where castration has to be performed owing to injury of the testicle through bites from other camels. Very often the wound has been neglected by the camelman, or he has applied mud or burnt rags to stop the hæmorrhage. The camel may not be brought for treatment till there is considerable suppuration and the injured testicle has become an enormous size. In such cases the testicle must be dissected out and an elastic ligature applied to the cord; the testicle can then be removed by cutting through the cord with a knife, 1 to  $1\frac{1}{2}$  inches below the ligature. The scrotum should then be plugged with tow dipped in weak phenyl or creosol solution, and the camel sent out to browse. The wound should be daily attended to, and care taken that the wound in the scrotum does not unite till the elastic ligature has cut through the cord, which it will do in about six days. Though the prognosis in other animals would be unfavourable, such cases in the camel usually do well and the animal appears to suffer very little.

Camels castrated under the age of six are wanting in bone, are badly developed, and resemble the female. They compare very unfavourably with the ungelded camel. On the other hand, camels castrated at seven years of age compare

very favourably with the ungelded camel; they are docile, keep their condition better, and are said by some to be capable of doing as much work as the ungelded. Though undoubtedly the gelded camel is docile and no trouble is experienced with him during the rutting season, it is open to question whether he is capable of performing the same amount of work and enduring the same amount of hardship as the ungelded camel.

## POISONING

Poisoning in camels arises chiefly from kaneir (oleander) and arsenic.

### Arsenical Poisoning.

Cases of arsenical poisoning occur from intentional administration or as the result of too large doses of arsenic being given during the treatment of surra.

**Symptoms.**—The symptoms vary considerably. In some cases, beyond great dulness and loss of appetite, no other symptoms are noticed. In other cases there is loss of appetite, vomiting, loss of control of the hind legs, inability to get up, restlessness and pain; diarrhœa, and sometimes constipation.

**Treatment.**—The most satisfactory results are obtained by the administration of linseed oil combined with chlorodyne or tincture of opium; this should be followed by demulcents—linseed tea, eggs, milk; and injection of strychnine (1 to 2 grains) may be given when loss of control of the hind legs is a prominent symptom and the camel is unable to get up. The antidotes are hydrated oxide of iron and calcined magnesia. They form with arsenic an insoluble compound.

**Post-Mortem Appearances.**—The lesions produced are inflammation of the fourth stomach and intestines, accompanied frequently by nephritis and peritonitis.

### Kaneir Poisoning.

Poisoning by kaneir (oleander) occasionally results from intentional administration, but most frequently by camels eating the plant. Many deaths occur from camels ingesting the plant, especially amongst animals that have not been bred in districts where kaneir is common. Cases usually occur when camels are turned out to browse after being a long time without food.

**Symptoms.**—The administration of 2 ounces of ground-up kaneir leaves produced the following symptoms: Twelve hours after administration the camel became dull and went off feed. After eighteen hours he started to vomit, became very dull, and died thirty-six hours after receiving the leaves. No diarrhœa was produced. On post-mortem nothing abnormal was observed.

The administration of 4 ounces of the leaves gave rise to the following symptoms:

After nine hours the camel went off feed and became very dull; twelve hours after, he began to vomit; at the eighteenth hour the dung became soft, followed an hour later by diarrhœa. Twenty-four hours after receiving the leaves he died.

*On post-mortem*, the only lesion found was inflammation of the fourth stomach.

**Treatment.**—A dose of linseed oil should be administered, followed by demulcents, such as linseed tea, milk, and eggs, and the dulness overcome by stimulants, such as sweet spirit of nitre or aromatic spirits of ammonia, given every hour in 2-ounce doses in 2 pints of water, or by hypodermic injections of strychnine 1 to 1½ grains.



## BIBLIOGRAPHY

- Veterinary Pathology (Friedberger and Fröhner).  
Veterinary Record, May 20, 1916.  
Annual Reports of Camel Specialist, 1908-1916.  
Report of Government Bureau of Microbiology of New South  
Wales, 1909.  
Journals of Tropical Veterinary Science, vol. vi., No. 3, 1911;  
vol. iv., No. 3, 1909; vol. vi., No. 4, 1911.  
Veterinary Therapeutics (Hoare).  
A System of Veterinary Medicine (Hoare).  
The Camel, its Uses and Management (Leonard).  
Burden Camels (Lennox Conyngham).  
Parasites and Parasitic Diseases of Domesticated Animals  
(Newman).  
A Manual of the Diseases of the Camel (Steel).  
Camels on Field Service (Rayment and Cook).

## APPENDIX I

### VERNACULAR NAMES OF DISEASES

Surra, Tibersa, Sar, Sar-giya, Pheta, Phitgiya, Kana hogia	} = Surra.
Kamzuri, Lissa	= Debility.
Bhukni, Thur, Zehmut	= Rinderpest.
Akar, Wah, Gathia	= Rheumatism.
Hawa lagia, Jhola	= Paralysis.
Mallee	= Suppuration of glands.
Galgund, Galgut	= Sore throat.
Cutch	= Brushing of elbow pad against chest pad.
Baddar	= Brushing of elbow against skin of chest wall.
Ruggi	= Slipping of tendon to side of hock.
Kapauli, Chalian	= Pus in frontal and maxillary sinuses.
Dust, Chhurka, Book	= Diarrhœa.
Maror, Paichish	= Dysentery.
Zehmat, Mora, Khrak	= Contagious catarrh, Influenza.
Sool and (in some districts) Zehmat	} = Anthrax.
Garhi	= Black quarter.
Utha, Mori	= Abscess.
Resauli	= Tumour.
Rafa	= Chest pad wound or tumour.
Zahar bad	= Lymphangitis.
Bookhar, Tap	= Fever.
Andhapan	= Blindness.
Kabbaz	= Constipation.
Chaichak, Matta, Thandian	= Camel-pox.
Badhazmi	= Indigestion.
Khansi	= Cough.
Kharish, Pan	= Mange.

(The term Zehmut is used for several diseases.)

## APPENDIX II

### VERNACULAR NAMES OF FODDER FED TO CAMELS IN THE PUNJAB

1. Missa Bhusa (Pea straw).  
Moth Bhusa (*Phaseolus aconitifolius* straw).  
Mong Bhusa (*Phaseolus radiatus* straw).  
Phaliyat (Taramira) (*Eruca sativa* straw).  
Phaliyat (Sarson) (Straw of Indian colza).  
Chitta Bhusa (Wheat straw).  
Massur Bhusa (Lentil [*Ervum lens*] straw).
2. Sabaz Guara (Green cluster bean).  
Sabaz Chola, Chena (Green pea plant).  
Sabaz Moth (Green *Phaseolus aconitifolius*).  
Sabaz Mung (Green *Phaseolus radiatus*).  
Sabaz Bhakra (Green *Tribulus alatus*).  
Sabaz Sarson (Green Indian colza).  
Sabaz Kanak, Gainhun (Green wheat).  
Sabaz Taramira (Green *Eruca sativa*).
3. The common grain fed to camels in the Punjab is  
gram (Chola, Chena) (Pea, *Cicer arietinum*).

## INDEX

- ABORTION in surra, 91  
 Abscess of the throat, 40  
 Acid, arsenious, 92  
     carbolic, liquid, 129  
 Afghan border variety, 30  
 Age, 5  
     determining, 5  
     to begin work, 2  
 Akar, 143  
 Aker, 107  
 Algeria, castration in, 138  
 Alimentary system, diseases of,  
     115  
 Aloes, 118  
 Alwar camel, 31  
     Maharajah of, 31  
     farm of, 39  
     purchases from, 44  
 Amaurosis, 66  
 Ammoniated tincture of quinine,  
     113  
 Ammonium carbonate, 113, 123,  
     124  
 Anæsthesia, 137  
 Aniseed oil, 97  
 Anthrax, 102, 133  
     bacillus, 102  
 Antiseptics, 55  
 Arabian camel, 1  
 Arsenate of sodium, 92  
 Arsenic treatment, 92  
     poisoning by, 122, 127, 140  
 Arsenious acid, 92  
 Asafœtida solution, 97  
 Australia, Western, castration  
     in, 138  
 Bacillus anthracis, 102  
     chauveii, 105  
     tuberculosis, 108  
 Bactrian camel, 1  
 Baddar, 4, 143  
 Baggage camel, 1  
     gear of, 12  
     pahari, 1  
     purchasing, 6  
 Baluchistan border variety, 30  
 Bara dang (flies), 93  
 Barley, 22, 25  
 Batesar Fair, 79  
 Belladonna, 113  
 Bicarbonate, sodium, 123  
 Bikanir camel, 31  
 Bites of hump, 55  
     legs, 55  
     scrotum, 139  
 Biting flies, protection against,  
     97  
 Black quarter, 104  
 Black wash, formula, 74  
 Blenkinsop, 78  
 Blood, examination of, 10  
 Bookhar, 143  
 Boot of sacking, 60  
 Boro-iodoform, 139  
 Breeding, camel-, 29  
     of camels, 32  
     indiscriminate, 2  
 Breeds of camels, 2  
 Bronchitis, parasitic, 114  
 Browning, 17  
 Budder, 11, 50, 60  
 Bukni, 143  
 Burke, 104  
 Calcined magnesia, 140  
 Camel, Bactrian, 1  
     baggage, 1  
     gear of, 12  
     purchasing, 6

- Camel, Baluchistan, 30  
     Bikanir, 31  
     breeding, 29, 32  
     breeds of, 2  
     herd, 39  
         Rewari, 39  
     Lyallpur, 32  
     northern, 1  
     pahari, 31  
     pox, 40, 79  
 Camphor, 113  
 Canal legislation, 29  
 Capacity for weight-carrying, 7  
 Carbolic acid, liquid, 129  
 Carbonate ammonium, 113, 123, 124  
 Castor oil, 80, 97  
     on wounds, 57  
 Castration, 138  
     in Algeria, 138  
 Catarrh, contagious, 113  
 Cautery, castration by, 138  
 Cervical vertebræ, dislocation of, 47  
 Chalian, 62, 143  
 Changa, 6  
 Chauveii, bacillus, 105  
 Cheechak, 34, 40, 79  
     inoculation for, 41  
 Chest pad, tumours of, 81  
 Chhatter, 6  
 Chhurka, 143  
 Chicrahs, 38  
 Chigga, 7  
 Chirpine oil emulsion, 97  
 Chloral hydrate, 135  
 Chlorate, potassium, 113  
 Chlorodyne, 93, 122, 125, 140  
 Chloroform, 137  
 Cicer arietinum, 144  
 Cirrhosis of liver, 132  
 Citronella oil, 97  
 Classes of camels, 2  
 Cleland, 69  
 Cleveland, 99  
 Cod-liver oil, 97  
 Cœnurus cerebralis, 116, 133  
 Cold weather, effect of, 8  
 Colic, 39  
 Common salt, 123  
 Condition, 8  
 Constipation, 39, 116  
 Contagious catarrh, 113  
 Copulation, 36  
 Cornea, opacity of, 65  
     perforation of, 65  
 Coughing, 10  
 Cresol emulsion, 97  
 Cross-bred type, 29  
 Croton oil, 118  
 Crupper, 12  
 Cutch, 11, 49, 60, 143  
 Cysts, hydatid, 116  
 Dachs, 32  
 Dance, courtship, 36  
 Delhi, 44  
 Dentition, 4  
 Derajat Wallah Oont, 31  
 Diarrhœa, 39, 122  
 Digitalis, 131  
 Disease, freedom from, 8  
     alimentary system, 115  
     head, 61  
     heart, 131  
     kidney, 131  
     liver, 132  
     microbial, 85  
     mouth, 61  
     nervous system, 133  
     respiratory system, 109  
     skin, 69  
     throat, 66  
 Dislocation, cervical vertebræ, 47  
     hip, 47  
 Distoma hepaticum, 116  
     lanceolatum, 116, 132  
 Dogla, 29, 30  
 Donda, 6  
 Drek, 43  
 Drench, to administer, 27  
     for tympanites, 123  
 Drenches, 116  
 Dressings, 54  
 Dromedary, true, 1  
 Dust, 143  
 Dysentery, 122, 125  
 Ear, pus in, 62  
 Echinococcus veterinorum, 116  
     cysts, 132  
 Eggs, 126, 141  
 Elastic ligature, 83  
 Electuaries, 113  
 Emulsions, 97  
     chirpine, 97

- Emulsions, cresol, 97  
     Jensen's, 97  
     kerosine, 97  
     paraffin, 78  
 Enteritis, 126  
 Epilepsy, 133  
 Epsom salts. See Magnesium sulphate  
 Eruca sativa, 77, 97, 144  
 Ervum lens, 144  
 Eserine, 120  
 Evans, Griffith, 87, 98  
 Examination for filaria, 10  
     trypanosoma evansi, 10  
     of blood, 10  
     of camels, 26  
 Experiments in feeding, 18  
 External parasites, 69  
 Eye, 10  
     affections of, 65  
     thorn wounds of, 57  
  
 Fæces, 10  
 Fair, Batesar, 79  
 Feeding, 17  
     experiments in, 18  
     manner of, 11  
 Feet, sore, 12, 60  
     thorn wounds, 56  
 Fetlock joint, tumours of, 83  
 Fever, red-water, 131  
 Filaria evansi, 98, 115  
     examination for, 10  
 Filariasis, 98  
 Flanks, condition of, 11  
 Flies, bara dang, 93  
     biting, protection against, 97  
 Fly-blow, prevention of, 57  
 Fodder, green, 125  
 Formulæ, 74, 78  
     black wash, 74  
 Fractures, 45  
     below hock, 46  
     knee, 46  
     of lower jaw, 45  
 Frontal sinusitis, 62  
  
 Gal sujh, 34, 40  
 Galgund, 143  
 Galgut, 143  
 Gamboge, 120  
 Gastritis, 125  
  
 Gathia, 143  
 Gear of baggage camel, 12  
 Gestation, period of, 33  
 Gibson, 126, 131  
 Giemsa method, 88  
 Girki, 11, 51, 60  
 Girth rope, 12  
 Glands, enlargement of, 68  
     inguinal, 12, 68  
     parotid, 68  
     prescapular, 68  
     swellings of, 12, 68  
 Goat-hair leading ropes, 13  
     webbing, 12  
 Gorindah thorn, 56, 60, 81  
 Goubeaux, 98  
 Government ration, 25  
     load, 2  
 Gram, 20, 21, 23, 144  
 Green cluster bean, 144  
     fodder, 125, 144  
     gram, 18  
     Indian colza, 144  
     moth, 18  
     pea plant, 144  
     Phaseolus aconitifolius, 144  
         radiatus, 144  
     sarson, 24  
     taramira, 18, 23  
     tribulus alatus, 144  
     wheat, 144  
 Groin, wounds in, 59  
 Gujrat camel, 31  
 Gulgut, 66  
 Gur, 34  
  
 Hæmatobya, 94  
 Hæmatopota, 94  
 Hæmorrhagic septicæmia, 99  
 Hæmopias sanguisuga, 116  
 Hair, goat-, ropes, 13  
     webbing, 12  
 Halt, sitting during, 15  
 Hariana, 44  
 Hawa lagia, 143  
 Hay, 25  
     oat, 25  
 Hepatic diseases, 132  
 Herd, camel-, 39  
     Rewari, 39  
 Hermal, 38  
 Hill baggage camel, 1  
 Hip, dislocation of, 47

- Hippobosca, 94  
 Hock, fractures below, 46  
 Hump, bites of, 55  
 Hydatid cysts, 116  
 Hydrate, chloral, 135  
 Hydrated oxide of iron, 140  
 Hyposulphite of soda, 113  
  
 Impaction of the rumen, 124  
 India, species in, 1  
 Indian corn, 25  
 Indigestion, 122  
 Indiscriminate breeding, 2  
 Influenza, 113  
 Inoculation for cheechak, 41  
 Iodine solution, 55  
 Iron, hydrated oxide of, 140  
  
 Jal-tree, 122  
 Jaw, lower, fracture of, 45, 55  
 Jensen's emulsion, 97  
 Jhola, 143  
 Jhoolak, 70  
 Jhooling, 70  
 Johnstone, 99  
  
 Kabbaz, 143  
 Kaithal, 42  
 Kamala, 116  
 Kamzuri, 143  
 Kanahogaya, 87  
 Kanalogia, 143  
 Kanat, sabaz, 144  
 Kaneir, 102, 122, 125, 140, 141  
 Kao, evergreen, 43  
 Kapauli, 62, 143  
 Kareel, 43, 44  
 Kerosene oil emulsions, 97  
 Khansi, 143  
 Kharish, 75  
 Khasil, 44  
 Khikar, 43  
 Khrak, 143  
 Knee, fractures below, 46  
     rope, 14  
 Kotila, 5  
 Kumree, 4, 10, 134  
 Kutch, 4  
  
 Lactation, period of, 33  
 Lameness, 11, 60, 107  
 Lana, 134  
 Leading rope, 13  
 Leeches, 61  
  
 Leese, 51, 62, 69, 98, 110, 114,  
     127, 129, 132, 136  
 Legs, bites on, 55  
 Leishman method, 88  
 Lice, 69  
 Ligature, elastic, 83  
 Linguatula tænioides, 115, 130  
 Linseed oil, 117, 125, 140  
     tea, 116, 124, 126  
 Linstow, Von, 133  
 Lissa, 143  
 Liver, diseases of, 132  
     cirrhosis of, 132  
 Load, Government, 2  
 Loading rope, 12  
     site for, 14  
 Lost camels, 6  
 Lyallpur camels, 32  
 Lymphatics, disease of, 68  
 Lyperosia, 94  
  
 Maggots in wounds, 11, 53, 58  
 Magnesia, calcined, 140  
 Magnesium sulphate, 93, 108,  
     112, 116, 119, 123, 130, 135  
 Maharajah of Alwar, 31  
     farm of, 31  
 Male camels, names of, 5  
 Malformations, 11, 49  
 Malignant œdema, 102  
 Mallee, 68, 143  
 Mandible, fracture of, 45, 55  
 Mange, 75  
 Marches, length of, 2  
 Maror, 143  
 Masth, 7, 37  
     bites during, 55  
     season, 30  
 Massur bhusa, 144  
 Matta, 79, 143  
 Maxillary sinusitis, 62  
 Mazat, 5  
 McFadyean's method, 102  
 Meningitis, 135  
 Method, Giemsa, 88  
     Leishman, 88, 89  
     McFadyean, 102  
 Methods of restraint, 26  
 Milk, 126, 141  
 Missa bhusa, 18, 20, 123, 144  
 Mong bhusa, 144  
 Montgomery, 44  
     anthrax in, 104



- Montgomery camel, 31  
 Mora, 110, 113, 143  
 Mori, 143  
 Moth, 43, 144  
 Moth bhusa, 18, 21, 144  
 Mouth, wounds of, 61  
 Mud, plastering wounds with, 11  
 Mumps, 68  
 Must, Musth. See Masth  
  
 Names of male camels, 5  
 Native remedies, 65  
 Neck rope, 12, 25  
 Nephritis, 131  
 Neshwalla, 6  
 Nitrate, potassium, 108, 112  
 Northern camel, 1  
 Nose net, 7  
     peg, 12  
         wounds from, 57  
 Nostrils, condition of, 11  
 Nunn, 103  
 Nux vomica, 123, 124  
  
 Oat hay, 25  
 Œdema, 131  
     malignant, 102  
 Œstrus cameli, 62  
 Oil, aniseed, 97  
     castor, 80, 97  
         on wounds, 57  
     chirpine, 97  
     citronella, 97  
     cod-liver, 97  
     croton, 118  
     kerosene, 97  
     linseed, 117, 125, 140, 141  
 Oleander, 122, 125, 140  
     poisoning, 102  
 Onchocerca fasciata, 69  
 One-humped camels, 1  
 Opacity of cornea, 65  
 Opium, tincture of, 122  
 Optic nerve, paralysis of, 66  
 Oxide of iron, hydrated, 140  
  
 Pace of baggage camel, 2  
     riding camel, 4  
 Pad, bruising of, 14  
     tumours of, 11, 59  
     wounds of, 59  
 Pahari camel, 31  
 Paichish, 143  
  
 Palan, fitting of, 53  
     inspection of, 17  
     sores, 4  
     wounds, 52  
 Palate, soft, protrusion of, 9  
     wounds of, 59  
 Palu, 9  
 Pan, 75, 143  
 Paraffin emulsion, 78  
 Paralysis, 133  
 Parasites, external, 69  
 Parasitic bronchitis, 114  
 Pawindah variety, 30  
 Pea straw, 25, 123, 144  
 Pease, 87  
 Peg, nose, 12  
     wounds from, 57  
 Perforation of cornea, 65  
 Pericarditis, 126  
     traumatic, 131  
 Period of gestation, 33  
 Peritonitis, 126  
     specific, 127  
 Peshawar, camels at, 1  
 Peshin variety, 30  
 Phaliyat, 144  
 Phaseolus aconitifolius, 144  
     radiatus, 144  
 Pheta, 143  
 Philhæmatomyia, 94  
 Phitgiya, 143  
 Phutaki, 43  
 Pilocarpine, 120  
 Pithgaya, 87  
 Plains baggage camel, 1  
 Pleurisy, 114  
 Pneumonia, 111  
 Points of baggage camel, 4  
     riding camel, 4  
 Poisoning, 140  
     arsenical, 122, 127, 140  
     oleander, 102, 122, 125, 140  
 Potassium chlorate, 113  
     iodide, 108  
     nitrate, 108, 112  
 Poti thistle, 44  
 Pox, camel, 40, 79  
 Pregnancy, sign of, 37  
 Puggi, 4  
 Puniah grass, 12  
 Punjab camel, 30  
 Purana, 87  
 Purchases from Alwar, 44

- Purchasing baggage camels, 6  
 Purgative, the best, 116  
  
 Quinine, ammoniated tincture of, 113  
  
 Rabies, 136  
 Rajputana camel, 30  
 Rakh, examination of, 96  
     grazing, 43  
 Ration, Government, 25  
 Red-water fever, 131  
 Reek, 39  
 Remedies, native, 65  
 Remounts, time to purchase, 97  
 Respiratory diseases, 110  
 Rest per week, 3  
 Restraint, methods of, 26  
 Rewari camelmen, 31, 39  
 Rheumatism, 12, 60, 107  
 Rice gruel, 126  
 Riding camel, 1, 4  
     pace of, 4  
     points of, 4  
 Rinderpest, 85, 122  
 Rope, girth, 12  
     leading, 13  
         goat-hair, 13  
     loading, 12  
     neck, 12, 25  
 Ruggi, 11, 50, 143  
 Rumen, impaction of the, 124  
 Rutting, habits of, 29  
     season, 33  
  
 Sacking, boot of, 60  
 Saddle, 12  
     removal of, 17  
     wounds, 52  
 Salicylates, 108  
 Salt, common, 123  
     Range, 42  
         type bred on, 31  
 Sandh, 32  
 Sar, 143  
 Sarcoptes cameli, 75  
 Sarcoptic mange, 75  
 Sareen, 43  
 Sargiya, 143  
 Satgaya, 87  
 Schistosomum Indicum, 115  
  
 Scrotum, bites of, 139  
 Septicæmia, hæmorrhagic, 99  
 Shapur, 44  
 Sheesham leaves, 107  
 Sheet, waterproof, 14  
 Sign of pregnancy, 37  
 Simulidæ, 94  
 Sindh camel, 31  
 Sinusitis, frontal, 62  
     maxillary, 62  
 Sirson, 43, 44  
 Site for loading, 14  
 Sitting down, manner of, 10  
     during halt, 15  
 Skin, diseases of, 69  
 Skin sac, tumours, 84  
 Smear, blood, 102  
     examination, 89  
 Smith, Lindsay, 99  
 Soamin, 92  
 Sodium, arsenate, 92  
     bicarbonate, 123  
     hyposulphite, 113  
 Soft palate, protrusion of, 9  
     wounds of, 59  
 Solution, iodine, 55  
 Sool, 39, 102  
 Sore feet, 12, 60  
     palan, 4  
     throat, 66  
 Southern camel, 1  
 Species of camel, 1  
 Spirit. æth. nitros., 113, 141  
     ammon. aromat., 113, 123, 141  
 Splashing of urine, 4  
 Staphylococci, 73  
 Steel, 103, 115, 133  
 Stomoxys, 94  
 Stourdy, 68  
 Straw, pea, 25, 123, 144  
     wheat, 25, 144  
     of Indian colza, 144  
     vernacular names, 144  
 Streptococci, 73  
 String of camels, 3  
     to nose peg, 13  
 Strongylus filariæ, 111, 115, 116  
 Strychnine injection, 140  
 Sulphate, magnesium, 93, 108, 112, 119, 123, 130, 135  
 Surra, 11, 87, 122, 143  
     abortion in, 91

- Tabanidæ, 93  
     life-history, 94  
 Tænia centripunctata, 115, 116  
     expansa, 116  
     globipunctata, 116  
 Tail, tying of, 4  
 Taramira, 43, 44, 144  
     emulsion, 97  
     green, 18, 23  
     oil, 77  
 Tartakowsky, 85  
 Tea, linseed, 116, 124, 126  
 Teat, bagging of, 33  
     examination of, 32  
 Teeth, 4  
     irregularities of, 61  
 Temperature, normal, 9  
     taking, 90, 96  
 Tetanus, 133  
 Thal camel, 31  
 Thandi-ki-bimari, 42  
 Thandian, 144  
 Thandis, 79  
 Thelazia Leesei, 65, 66, 115  
 Thistle, poti, 44  
 Thorn, gorindah, 56, 60, 81  
     wounds of eye, 57  
     feet, 56  
 Throat, abscess of, 40  
     sore, 66  
 Throwing a camel, 28  
 Thur, 143  
 Tibirsa, 87, 143  
 Ticks, 69  
 Tirhan, 6  
 Toda, 32  
 Traumatic pericarditis, 131  
 Trephining sinuses, 63  
 Trichocephalus cameli, 115, 116,  
     122  
 True camel, 1  
     dromedary, 1  
 Trypanosoma Evansi, 10, 87,  
     116  
 Tuberculin test, 109  
 Tuberculosis, 108  
 Tucked-up appearance, 7  
 Tumours of chest pad, 81  
 Tumours of fetlock joints, 83  
     of pads, 11, 59  
 Turkestan, camels from, 1  
 Turnips, 22  
 Tushes, 4  
 Two-humped camel, 1  
 Tympanites, 123  
 Type of camel, 6  
     cross-bred, 29  
 Urinary diseases, 131  
 Urination, time for, 16  
 Urine, splashing of, 4  
 Urticaria, 79  
 Varieties of camels, 30  
     Afghan border, 30  
     Baluchistan, 30  
     pawindah, 30  
     peshin, 30  
 Venesection, 135  
 Vertebrae, cervical, dislocation  
     of, 47  
 Vicious camels, 25  
 Wail, 132, 133  
 Waterproof sheet, 14  
 Weather, effect of cold, 8  
 Webbing, goat-hair, 12  
 Weight-carrying, 7  
 Western Australia, 138  
 Work, age to begin, 2  
 Working life of baggage camel, 2  
 Wounds, 11, 52  
     bites, 55  
     castor oil on, 57  
     hump, 55  
     legs, 55  
     maggots in, 11, 53, 58  
     mouth, 61  
     mud-plastering of, 11  
     nose peg, 57  
     pads, 59  
     saddle, 52  
 Zahmut, 110  
 Zehmat, 113, 143



# An Abridged List of Works

PUBLISHED BY

## BAILLIÈRE, TINDALL & COX.

---

- ADAMS & CASSIDY'S** Acute Abdominal Diseases, including Abdominal Injuries and the Complications of External Hernia. Demy 8vo. Pp. x+572, with 28 Illustrations. Price 12s. 6d. net.
- BJORKEGREN'S** Handbook of Anatomy for Students of Massage. Demy 8vo. Pp. x+233, with 73 Illustrations. Price 5s. net.
- BLAIR BELL'S** The Principles of Gynæcology.  
Second Edition. Pp. xxviii+551, with 6 Coloured Plates and 363 Illustrations. Royal 8vo. Price 21s. net.
- BLAIR BELL'S** The Sex Complex: A Study of the Relationships of the Internal Secretions to the Female Characteristics and Functions in Health and Disease. Demy 8vo. Pp. xx+233. With 7 Coloured and 43 Plain Plates. Price 12s. 6d. net.
- BLOMFIELD'S** Anæsthetics.  
Fourth Edition. Crown 8vo. Pp. viii+147, with 22 Illustrations. Price 4s. net.
- BRADFORD & LOVETT'S** Orthopædic Surgery.  
Fifth Edition. Royal 8vo. Pp. x+416, with 369 Illustrations. Price 15s. net.
- BROWN'S** Physiological Principles in Treatment.  
Third Edition. Pp. x+408. Price 5s. net.
- BUCHANAN'S** Manual of Anatomy, Systematic and Practical, including Embryology. Third Edition. Complete in 1 volume. Demy 8vo. Pp. 1780, with 670 Illustrations, mostly original, and in several colours. Price 21s. net. (*University Series.*)
- CABOT'S** Physical Diagnosis.  
Sixth Edition. Royal 8vo. Pp. xxii+521, with 260 Illustrations. Price 16s. net.
- CARREL'S** Treatment of Infected Wounds.  
Translated by Capt. H. CHILD, Surgeon French Red Cross. Introduction by Sir ANTHONY BOWLBY. Crown 8vo. Pp. xii+238, with 97 Illustrations. Price 5s. net.
- CHAPIN & PISEK'S** Diseases of Infants and Children.  
Third Edition. Royal 8vo. Pp. xviii+578, with 12 Coloured Plates and 179 Illustrations. Price 15s. net.
- CLARK'S** Dispensary Treatment of Pulmonary Tuberculosis. Royal 8vo. Pp. viii+280, with 20 fold-in Tables. Price 15s. net.

**COBB'S The Organs of Internal Secretions: their Diseases and Therapeutic Applications.** Crown 8vo. Pp. x + 236. Price 5s. net.

**DIEULAFOY'S Text-Book of Medicine.**

Translated by V. E. COLLINS and J. A. LIEBMANN. In 2 volumes. Second Edition. Royal 8vo. Pp. xxiv + 2156, with 9 Coloured Plates and 99 Illustrations. Price 25s. net.

**DOYEN'S Surgical Therapeutics and Operative Technique.** Prepared by the Author in collaboration with H. SPENCER BROWNE, M.B. Cantab. To be completed in 3 volumes, price 75s. net. Vol. I. now ready. Large Royal 8vo. Pp. x + 782, with 1038 Illustrations. Price 25s. net.

**FITZWILLIAMS' Practical Manual of Bandaging.**

Demy 8vo. Pp. viii + 92, with 141 Illustrations. Price 3s. 6d. net.

**FITZWILLIAMS' Operative Surgery, with Surgical Anatomy and Surface Markings.** Demy 8vo. Pp. viii + 450, with 284 Illustrations. Price 10s. 6d. net.

**FOX'S Physical Remedies for Disabled Soldiers.**

Demy 8vo. Pp. xiv + 277, with 90 Illustrations. Price 7s. 6d. net.

**FRENCH'S Medical Laboratory Methods and Tests.**

Third Edition. Pp. viii + 202, with 88 Figures, plain and coloured. Leather, gilt tops. Price 5s. net.

**GARDNER'S Manual of Surgical Anæsthesia.**

Second Edition. Demy 8vo. Pp. xii + 220, with 8 Plates and 36 other Illustrations. Price 7s. 6d. net.

**GREEN'S Pathology.**

Twelfth Edition. Royal 8vo. Pp. x + 642, with 350 Illustrations. Price 18s. net. (*University Series.*)

**HAYES' The Intensive Treatment of Syphilis and Locomotor Ataxia by Aachen Methods.** Second Edition. Crown 8vo. Pp. vi + 88, and 4 Plates. Price 3s. 6d. net.

**JUNG'S Collected Papers on Analytical Psychology.**

Authorized Translation. Edited by DR. CONSTANCE E. LONG. Demy 8vo. Second Edition. Pp. xviii + 492. Illustrated. Price 15s. net.

**KERR'S Operative Midwifery.**

Third Edition. Royal 8vo. Pp. xvi + 726, with 308 Illustrations, mostly original. Price 25s. net.

**KRAEPELIN'S Lectures on Clinical Psychiatry.**

Authorized Translation of the Second German Edition. Revised and Edited by THOMAS JOHNSTONE, M.D. EDIN., M.R.C.P. LOND. Third English Edition. Pp. xviii + 368. Price 10s. 6d. net.

**LAMB'S Diseases of the Throat, Nose, and Ear.**

Fourth Edition. Crown 8vo. Pp. xvi + 352, with 55 Illustrations. Price 8s. 6d. net.

**LUYS' Gonorrhœa and its Complications.**

Translated by A. FOERSTER, M.R.C.S. Demy 8vo. Second Edition, with about 200 Illustrations and 3 Coloured Plates. Price 21s. net. (*In Preparation.*)

**McCAW'S Diseases of Children.**

Demy 8vo. Pp. xii+524. With 14 Plates and Illustrations. Price 10s. 6d. net.

**MACEWEN'S Surgical Anatomy.**

Second Edition. Demy 8vo. Pp. xiv+498, with 79 Illustrations, plain and coloured. Price 10s. 6d. net.

**McKISACK'S Dictionary of Medical Diagnosis.**

Second Edition. Demy 8vo. Pp. xii+590, with 76 Illustrations. Price 10s. 6d. net.

**MARSHALL'S Syphilology and Venereal Disease.**

Third Edition. Demy 8vo. Pp. viii+466. Price 10s. 6d. net.

**MATHEWS' Physiological Chemistry.**

Second Edition. Royal 8vo. Pp. viii+1040, with 77 Illustrations. Price 21s. net.

**MAY & WORTH'S Diseases of the Eye.**

Fourth Edition. Demy 8vo. Pp. viii+442, with 336 Illustrations, including 22 Coloured Plates. Price 10s. 6d. net.

**MONRO'S Manual of Medicine.**

Fourth Edition. Demy 8vo. Pp. xxii+1024, with 42 Illustrations, plain and coloured. Price 18s. net. (*University Series.*)

**MORISON'S Sensory and Motor Disorders of the Heart :**

Their Nature and Treatment. Demy 8vo. Pp. viii+260, with 51 Illustrations. Price 7s. 6d. net.

**MUMMERY'S After-Treatment of Operations.**

Fourth Edition. Crown 8vo. Pp. x+276, with 39 Illustrations. Price 5s. net.

**MUTER'S Analytical Chemistry, Qualitative and Quantitative, Inorganic and Organic.**

Tenth Edition. Pp. xiv+238, with 56 Illustrations. Price 6s. net.

**ROBERTSON'S I.K. Therapy in the Treatment of Tuberculosis.**

Crown 8vo. Pp. xii+151, with 9 Illustrations and 2 Charts. Price 5s. net.

**ROSE & CARLESS' Manual of Surgery.**

Ninth Edition. Demy 8vo. Pp. xii+1408. With 16 Coloured Plates and 609 Illustrations. Price 21s. net. (*University Series.*)



**SCHMIEDEN'S The Course of Operative Surgery.**

Translated from the Second Edition and Edited by ARTHUR TURNBULL, M.A., M.B., B.Sc. GLASC. Royal 8vo. Pp. xx+346, with 435 Illustrations, mostly coloured. Price 12s. 6d. net.

**SIMON'S Infection and Immunity.**

Third Edition. Royal 8vo. Pp. x+352, with 12 coloured and 20 plain Illustrations. Price 14s. net.

**SOMMERVILLE'S Practical Sanitary Science.**

Demy 8vo. Second Edition. Pp. viii+328, with 79 Illustrations. Price 10s. 6d. net.

**STARR'S Organic and Functional Nervous Diseases.**

Fourth Edition. Royal 8vo. Pp. 970, with 30 Plates, plain and coloured, and 323 Figures in the text. Price 25s. net.

**STEWART'S Manual of Physiology.**

Seventh Edition. Demy 8vo. Pp. xx+1160, with Coloured Plate and 467 Illustrations. Price 18s. net. (*University Series.*)

**TIBBLES' Dietetics; or, Food in Health and Disease, including Vitamines and Deficiency Diseases.**

Demy 8vo. Pp. x+628. Price 12s. 6d. net.

**TREDGOLD'S Mental Deficiency (Amentia).**

Second Edition. Demy 8vo. Pp. xx+492, with 67 Illustrations and 28 Tables, Charts, etc. Price 12s. 6d. net.

**TUCKEY'S Treatment by Hypnotism and Suggestion.**

Sixth Edition. Demy 8vo. Pp. xxviii+432. Price 10s. 6d. net.

**WALSH'S Diseases of the Skin.**

Demy 8vo. Pp. xvi+300, with 29 Illustrations. Price 6s. net.

**WHITLA'S Pharmacy, Materia Medica, and Therapeutics.**

Tenth Edition. Pp. xii+680, with 23 Illustrations. Price 9s. net.

**WHITLA'S Dictionary of Treatment.**

Fifth Edition. Pp. x+1204. Price 16s. net.

**WILLIAMS' Minor Maladies and their Treatment.**

Fourth Edition. Crown 8vo. Pp. viii+396. Price 6s. net.

**YOUNGER'S Insanity in Everyday Practice.**

Fourth Edition. Crown 8vo. Pp. x+146. Price 5s. net.

---

BAILLIÈRE, TINDALL & COX,

8, HENRIETTA ST., COVENT GARDEN, LONDON, W.C. 2.



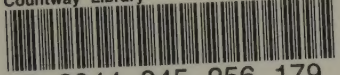


35.Z.1.

The camel and its diseases; bei1917

Countway Library

AWQ1548



3 2044 045 256 179



35.Z.1.

The camel and its diseases; bei1917

Countway Library

AWQ1548



3 2044 045 256 179